JUNE 1956
VOL. LI No. 6

H.8
H69

VETERINARY Medicine

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features in this issue...

History of Some Current Problems in Animal Disease

Klebsiella Mastitis in Dairy Cows

Advances Made in Swine Practice
Part VI: Brucellosis

Use of 11-Ketoprogesterone in Treatment of Hypoglycemia

Radical Amputation of the Posterior Appendage in Dogs

Breeding and Disease Problems in Mink

Use of Oral and Parenteral Tetracycline

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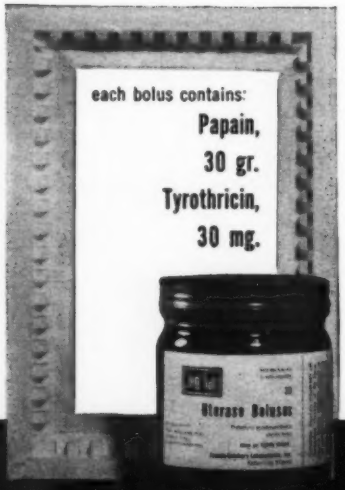

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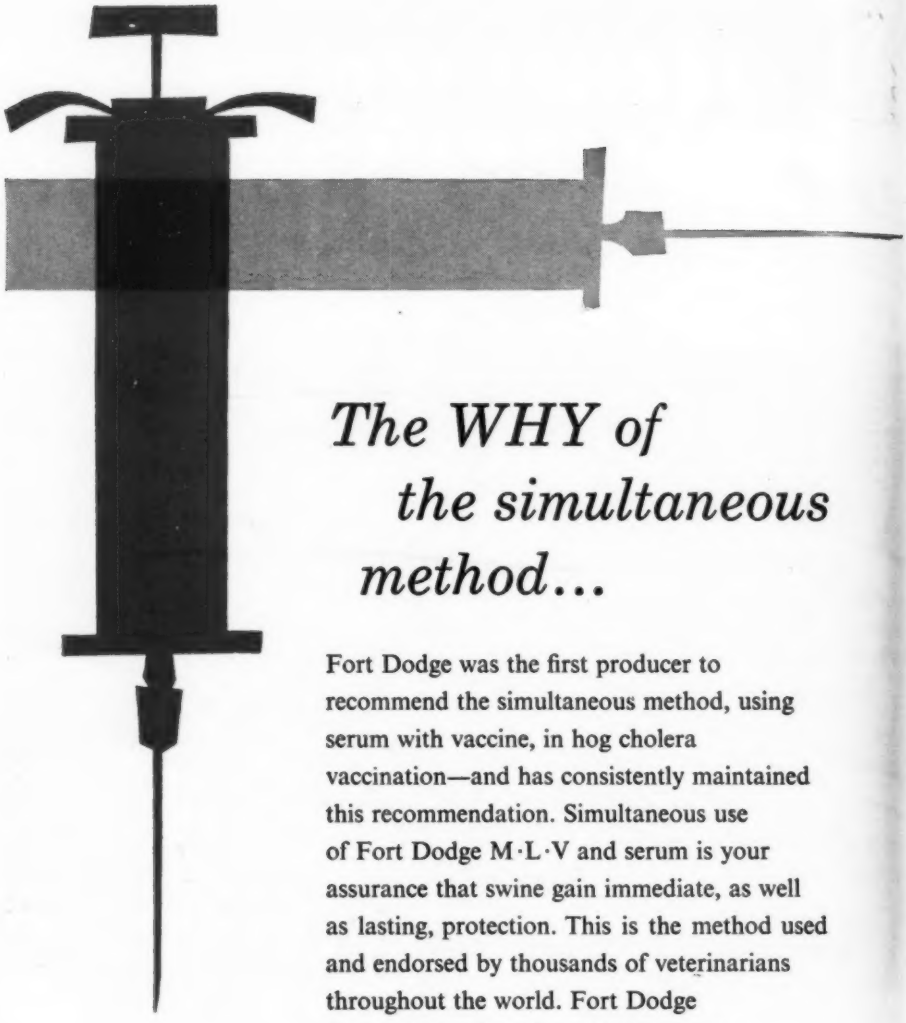

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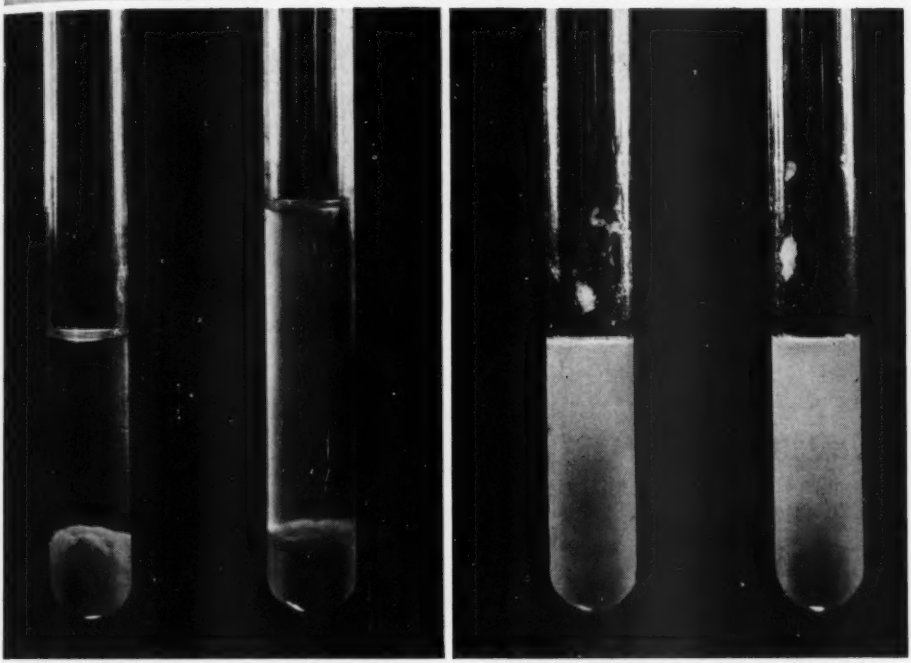

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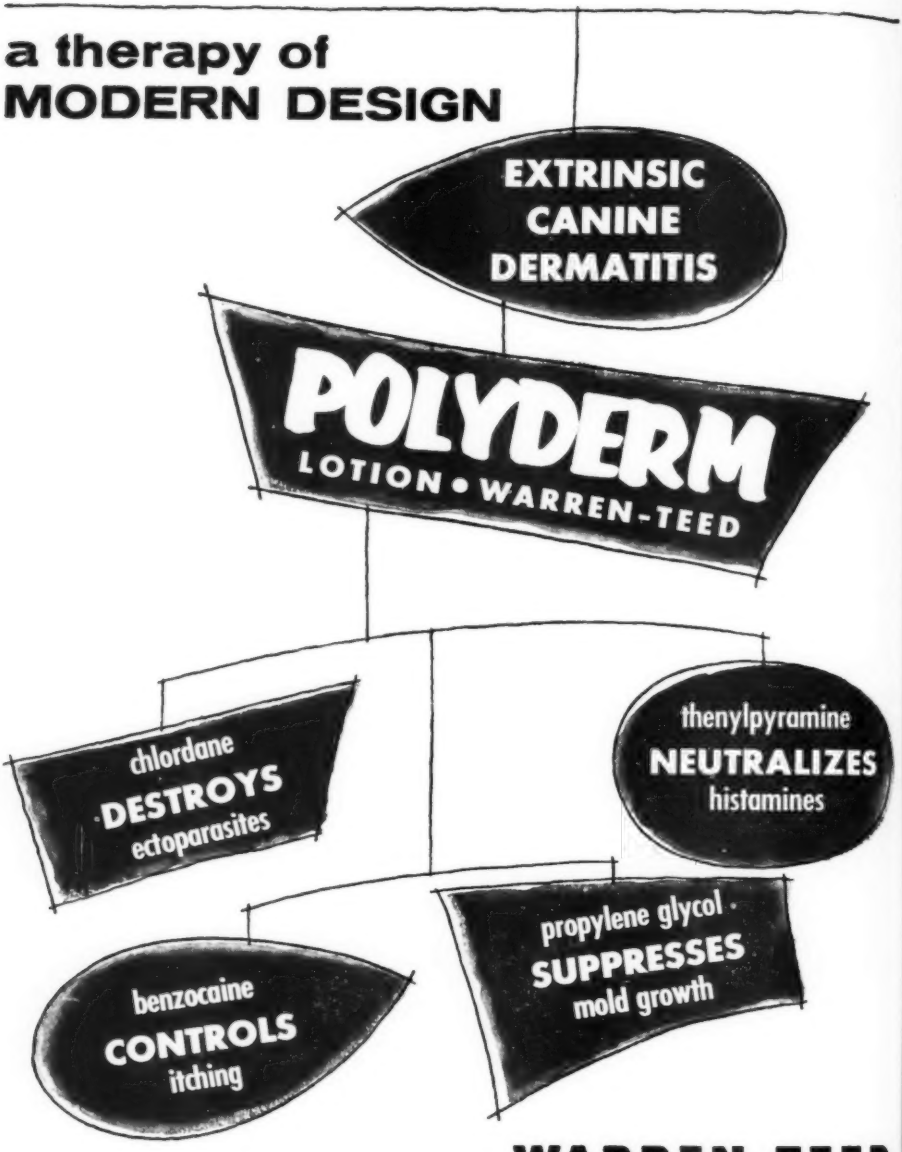

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Over 35 years ago, the secretary of the United States Livestock Sanitary Association urged that national veterinary vital statistics be collected and distributed. The recommendation was based on the studied conclusion that such intelligence information was necessary if adequate disease control measures were to be applied. Back volumes of VETERINARY MEDICINE reveal slow progress against discouraging indifference and inertia. It was not that the idea lacked moral support but it did lack funds and a central agency charged with the responsibility for its accomplishment.

Special disease reports have been prepared by various government agencies for some years. The U. S. Public Health Service collects and publishes weekly statistics on rabies. Special annual, and in some instances monthly, reports indicate the incidence of anthrax and tuberculosis; less comprehensively (recent reports excepted) that of brucellosis in cattle. There also has been established in a number of states monthly reports compiled by livestock sanitary officials cooperating with state public health veterinarians. Some of these are proving their usefulness by presenting dependable estimates of the disease situation. Others are improving in this respect. Uniformity of these state reports is to be desired.

The long-awaited National Animal Morbidity Report is now an actuality. Under date of March 8, 1956, there was addressed to all Animal Disease Eradication Branch Stations, state livestock sanitary officials, and state departments of public health, the first Animal Disease Eradication Branch report of animal morbidity for the month of January, 1956. The report includes statistical information on the following diseases: Brucellosis, tuberculosis, paratuberculosis, scabies, vesicular exanthema, anthrax, equine encephalomyelitis, scrapie, dourine, glanders, and blue tongue.

A commendable start has been made. Success of the monthly analysis will depend not alone on the efficiency of Dr. J. L. Hourrigan, chief, Special Diseases Eradication Branch, A.R.S., USDA, and his staff, who have been assigned the task of assembling a monthly animal disease report, but upon the cooperation and support of all practitioners. It is essential to improvement of the statistical usefulness to all concerned, not the least of which is the practitioner, that incidence of reportable diseases be submitted to state officials promptly.

VETERINARY Medicine

Established 1905

Registered in U. S. Patent Office

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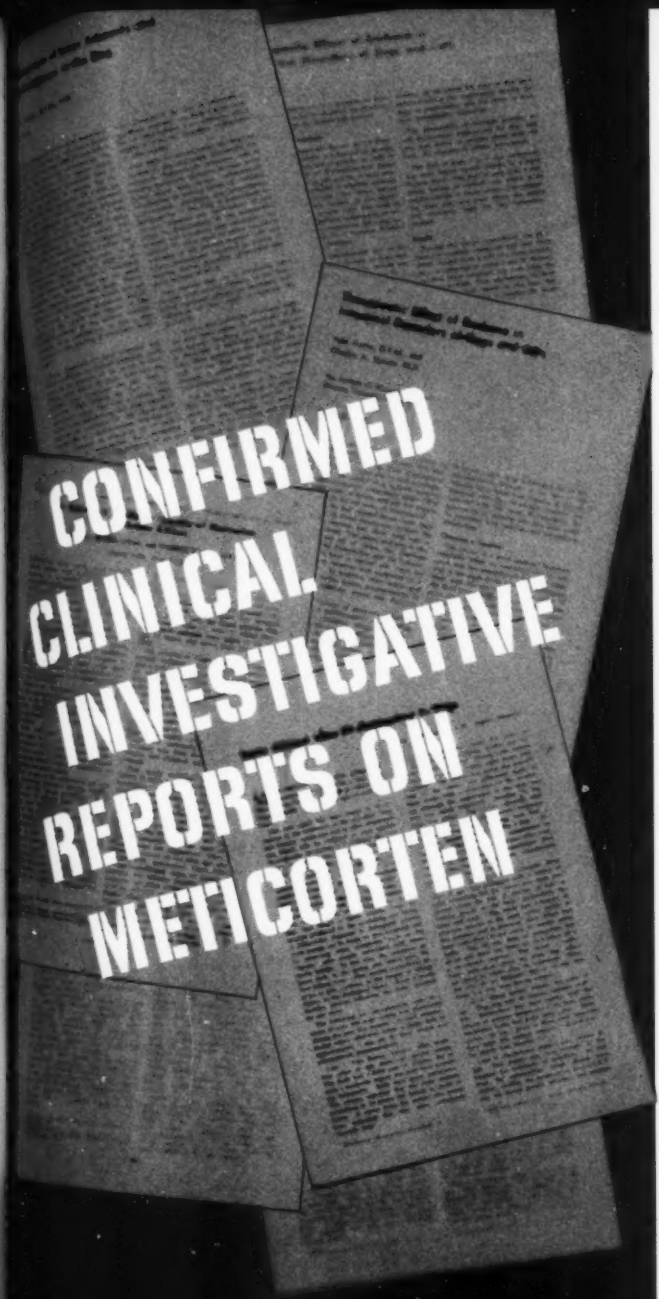

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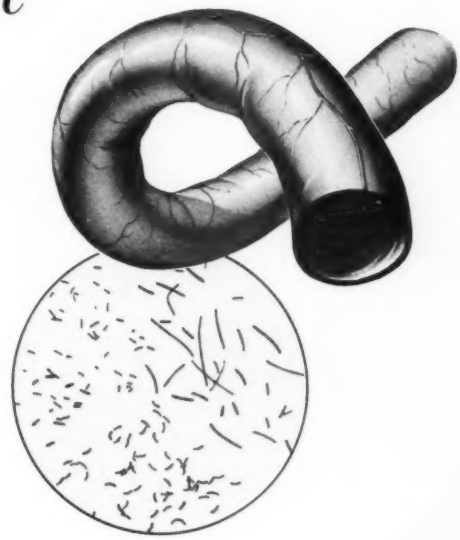

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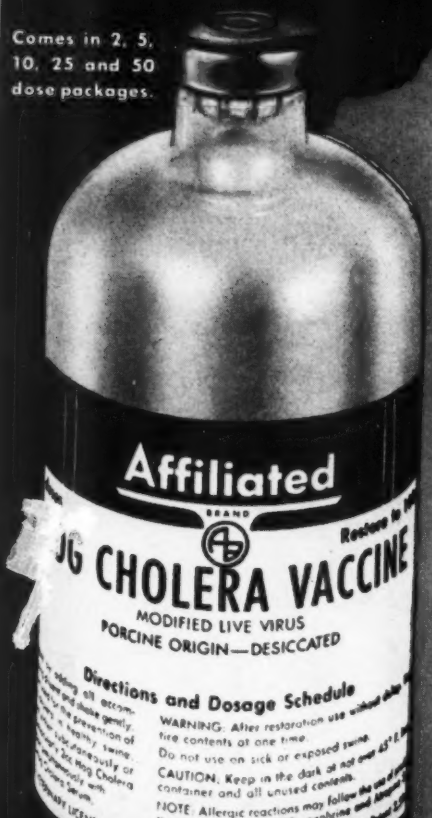
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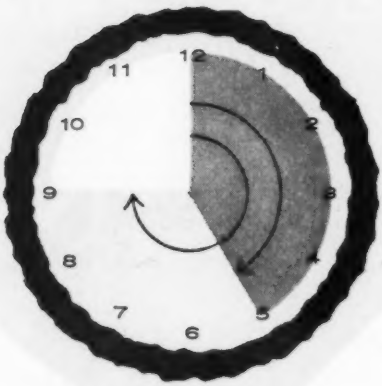

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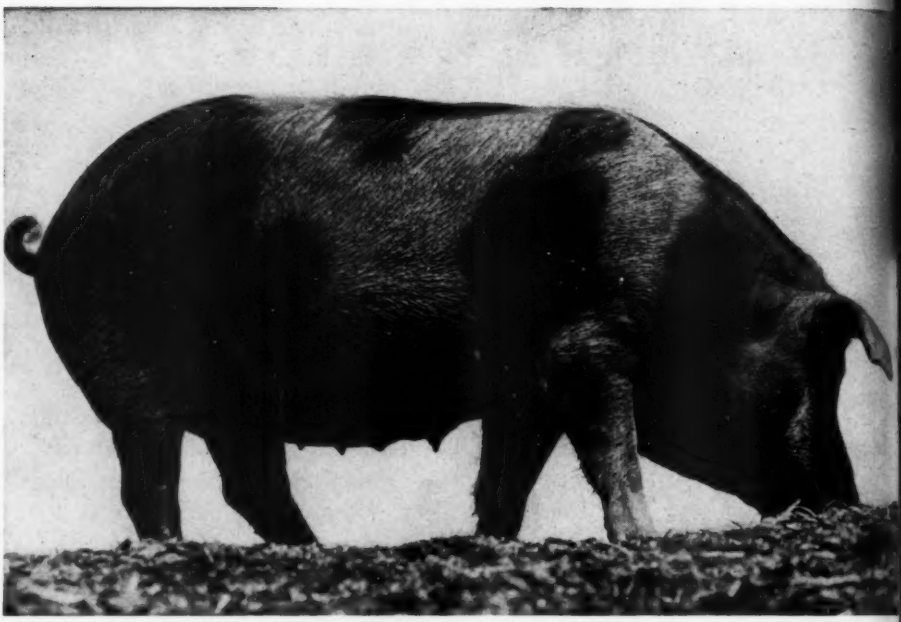

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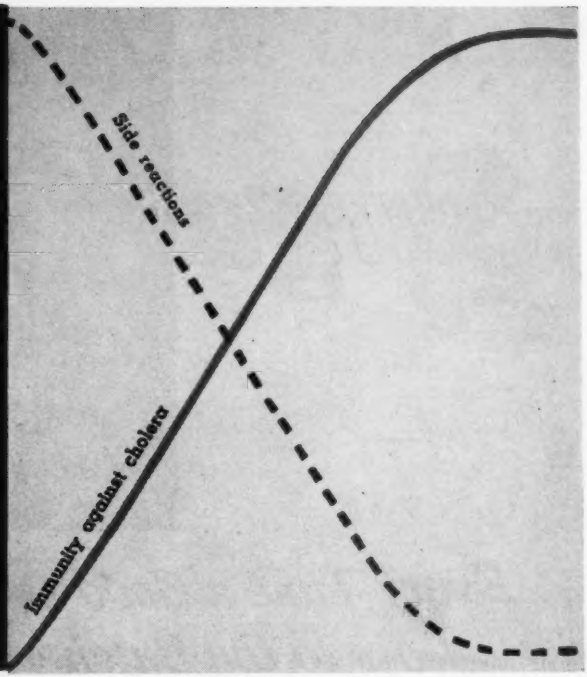

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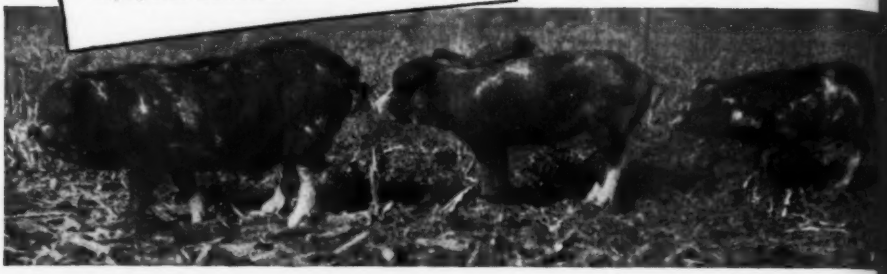

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The History Of Some Current Problems In Animal Disease: III. Rinderpest

J. F. SMITHCORS,* D.V.M., Ph.D., East Lansing, Michigan

VETERINARY students frequently ask why they should study a disease which has never appeared in the United States, and only briefly in the Western Hemisphere. The obvious answer is usually sufficient stimulus to learn the characteristics of this and other exotic diseases, even for those who do not anticipate foreign service. In addition to the time-honored tradition of protecting our shores from accidental invasion, the potential threat of bacteriological warfare has added new impetus to the serious study of diseases such as rinderpest. The memory of the outbreaks of foot-and-mouth disease, still vivid to many practicing veterinarians, and the sudden appearance of new disease entities such as mucosal disease and X disease, which may simulate exotic epizootics, serve as recurring reminders of the folly of complacency.

Pestilence, or the threat of it, has ever been the opportunity of medical research; the potentiality of rinderpest as a weapon of war led to the Grosse Isle project which added to our knowledge of rinderpest and resulted in more effective means of combatting this scourge. In the report of this research (*Am. Jour. Vet. Res.*, April 1946), the only reference to the significance of the project was that, "The possibility of the introduction of rinderpest into this continent has long been a matter of serious concern. As a result both of increasing air travel and suspected enemy interest in biological warfare, this possibility became alarming in the latter part of 1941." Certainly, no one would doubt that rinderpest is an ever-present threat; the term itself carries a connotation of menace, but in the minds of many it is the threat of what is unknown rather than the fruits of bitter experience. It is fortunate that this is so. But it is an axiom in warfare that a primary requisite is to know fully the potential of the enemy; it is not sufficient to know merely that he is capable of dealing a deadly blow. We must be aware of his strength, and the sources of his strength, his methods of attack, and the quarter from which his attack might come. If pressed hard enough, the average veterinarian might recall that the cattle plague, like Attila the Hun, caused considerable havoc in Europe sometime in the remote past. Perhaps we need an occasional reminder that the loss was some 200,000,000 cattle, eight times the present population of dairy cows in the United States, and that it was only two generations, not two or more centuries, ago that rinderpest was still a riddle. Lest anyone think the eradication of rinderpest in Europe ends the story, let him talk to an Asian colleague.

Origin of Rinderpest

The origin of the cattle plague is shrouded in antiquity. Ancient historians make frequent reference to plagues which left whole country-

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sides without a work animal, oxen being the chief draft animals for centuries. While descriptions are fragmentary, there is little doubt that certain of these visitations were that of cattle plague, or rinderpest. Virgil, in the first century B.C., speaks of ". . . . . many diseases of cattle, killing not one here and there, but a whole summer pasture." A plague in A.D. 376, which "swept away all the cattle in Europe," has been identified beyond doubt as rinderpest. Virgil's statement that men were forced to "tug the creaking wagons over a towering hillside," is as poignant as it is poetic; there are numerous records through the 18th century of whole populations reverting to the status of draft animals in the wake of the cattle plague. One such report in 1480 states that "women and children pulled the plows at night to avoid the tax on draft animals." Just what the men were doing at this time is not stated.

In modern times, all roads lead to eastern Russia in tracing the origin of the outbreaks of the cattle plague which devastated Europe throughout most of the 18th and 19th centuries. Not only has it been possible to trace every outbreak to cattle imported from eastern Europe or the Balkan countries, but earlier visitations of the plague in Europe and Asia coincide with the routes of the Mongol armies. Some significance must be placed upon the fact that the Russian term, *Tchouma,* used for rinderpest, is identical with the term employed by the Mongols and Tartars of central Asia to signify "a malevolent deity, something of the nature of a vampire." Ancient plague tokens, a number of them from Mongolia, figuring this demon, have been found. It is suggested that these may have been placed about the necks of animals to protect them, much in the same manner as bags of asafetida were used only a century or less ago in America for both man and beast. Another common practice of primitive peoples has been the making of votive animals to be placed in the church as a means of invoking divine dispensation for protection from the plagues of animals. Hundreds of these statuettes, dating from the 8th century B.C. to modern times have been found.

The first really reliable records of rinderpest date to the early 18th century when the plague broke out in Italy in 1711. In this instance, the outbreak was traced to a single ox imported from Hungary, the early course of the plague in Italy coinciding with the movements of this particular animal. Although Italy had been the leader in the regeneration of equine veterinary medicine after the almost total abandonment of the study of animal disease, there was no one ready to cope with anything of the proportions of a major plague, particularly of cattle. The care of animals had long been in the hands of the most ignorant empirics, and consequently men of education and ability, particularly medical men, considered the practice of veterinary medicine beneath their stations. It is as surprising as it was fortunate, therefore, that two eminent physicians could be found who were willing and able to investigate the plague and make recommendations for its control. But in all times, however great the chasm between human and veterinary medicine may have become, there have always been the enlightened few who recognized the fundamental identity of the two disciplines.

One of these was Bernardino Ramazzini, professor of medicine at the University of Padua, who had made important contributions to the study of occupational diseases. The results of his investigations of the cattle plague were presented in the form of an introductory lecture to the medical classes at Padua. While his work on this subject is in many respects inferior to that of his compatriot, Lancisi, it is of some interest that Ramazzini's Dissertation on Rinderpest (1742) is the only paper on animal disease to be found in the 38 volumes of the Bulletin of the History of Medicine. The intent of the paper is to establish an additional claim to fame for Ramazzini as an epidemiologist rather than to record a chapter in the history of rinderpest. Lancisi's definitive work in this field appears not to be recorded in any of the publications in medical history. In this connection it is worth noting the comment of the historian, C. F. Mullett, who in a critical analysis of The Cattle Distemper in mid-Eighteenth Century England, in the publication, Agricultural History (1946), says:

". . . . . the historian of science as well as the more general historian has passed by the cattle distemper as if the maladies of lower animals were unworthy of his attention. The historical study of comparative pathology has often been neglected even though animal plagues and human pestilences have on occasion gone hand in hand. . . . . .

Leading physicians, such as Bernardino Ramazzini and Giovanni Lancisi, turned their attention to it (the cattle plague) and established, if they did not inaugurate, the study of comparative pathology."

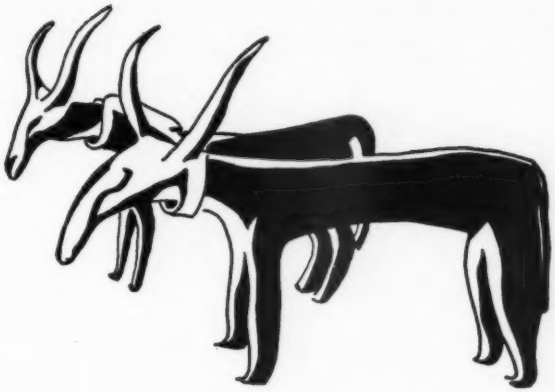

Fig. 1. Votive oxen. Altar gift offered to secure protection from cattle plague. Postmedieval period.

Ramazzini mentions the importance of oxen in Italian agriculture and the consequent value to be placed upon study of the current epidemic, saying that it should not be beneath the dignity of medical men to attend to these matters. Ramazzini's study was undertaken at the request of the Duke of Venice. After carefully detailing the symptoms, he states: ". . . . . we shall be right in absolving air and pasture from any charge that they were implicated in causing this disease. . . . Hence, it will be necessary to search for some other cause and the only possible source of infection that it is possible to consider in this case is some contagious fomites."

He recognized that in addition to the sick and the dead, living animals might serve as carriers, and that stables were a pregnant source of infection. He recommends sound hygenic measures in disposal of the dead by deep burial and by frequent cleaning and fumigation of stables. Only by inference, however, does he suggest segregation of the sick from the healthy, and instead of recognizing the futility of treatment, recommends heroic doses of quinine and broth of vipers. In no case does he advise slaughter as a means of control.

Ramazzini's lecture was given six years after his investigation, at which time he was 78 years of age. This may explain, if not excuse, his anticlimactic concluding statement, which if taken at face value would cast doubts upon the validity of his entire investigation. He asks, "But why do I tax my meagre talents and rack my poor brains to investigate the nature and causes of this disease and to apply medical principles to veterinary problems? . . . It is manifest that the cause is none other than a punishment from God himself, justly enraged at our iniquities."

As late as 1865, a noted bishop in Britain attributed the then rampant cattle plague directly to "God's displeasure at our great love for animals, or cattle worship." Another cleric spoke of "our national, but carnal, love of beef, for which the murrain was sent as a Divine chastisement." The appointment of fast-days, and prayers for deliverance from the plague led Fleming, in his work on Animal Plagues (1871) to observe, "It is generally so much easier to pray than to obey sanitary behests."

While this clerical attitude was so general that in itself it was the major deterrent to effective research upon animal disease, particularly that of an epizootic character, there was in 1711 at least one notable exception in the person of Pope Clement XI. Giovanni Lancisi, personal physician to the Pope, was appointed to investigate the outbreak of cattle plague around Rome; his preliminary studies paralleled those of Ramazzini, except that Lancisi's superior insight into the problem is at once apparent. In retrospect, we can see that his general observations on the cause of the plague, and his specific recommendations for its suppression, are in complete harmony with present-day thought. Recognizing the cause of the plague as "some exceedingly fine and pernicious particles which pass from one body to another," Lancisi continues, " . . . the seeds of the contagion were not only carried by sick oxen, but were more frequently conveyed by shepherds and veterinary surgeons, who brought the infection to the healthy; and it was also transmitted by dogs and other animals."

Unlike his colleagues in Naples, Lancisi recognized the futility of attempting treatment of the sick, stating, "I advised that every diseased animal should be killed; for I main-

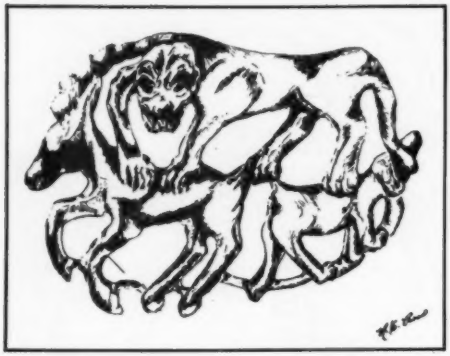

Fig. 2. Plague token. Probably worn by animals to protect them from plague. Ancient period.

tained that, should they be left to a slow death, the costs for medicines, veterinary surgeons, attendants, and other means, would be very great; and not only this, but their very presence would assist in the diffusion of the contagion. . . . It is well posterity should know, that of all the many and powerful remedies tried during the pestilence, none has been found which will bear the name of a proper or specific remedy."

Lancisi's report was made before an assemblage of the College of Cardinals, and it is not surprising that they should have been loath to accept his recommendation of slaughter as a control measure. Not only was Lancisi's advice the first suggestion of its nature, and seemed contrary to the tenets of humane treatment of animals, but many hawkers of nostrums, and not a few medical men, claimed to possess infallible cures. The wiser counsel of Lancisi finally prevailed, and while doubt exists as to how extensive a slaughter program was followed, contemporary reports indicate that the plague was arrested in nine months around Rome, but raged uncontrolled elsewhere in Italy for several years. Centuries earlier Virgil had directed, upon finding a sick sheep,

"You must nip that evil in the bud, you must use your knife and kill before its dread contagion creeps through the oblivious flock," but there is no evidence that his advice had ever been followed. Lancisi can be given full credit for originating the concept of control by slaughter.

Lancisi also gave detailed hygenic measures to be followed in combatting the plague, and formulated a code to be followed in the event of another visitation. This included an absolute quarantine of persons and animals, segregation of the healthy from the sick, the latter being speedily killed and buried in quicklime, the removal of the healthy animals from infected stables and pastures, and a measure now recognized as an essential part of any control plan—"the severest punishment should be inflicted on those who disobey." Concerning the value of what he had accomplished, he says, "I may be asked of what benefit can this commentary be to posterity, as I have no remedy to offer for the cure of the plague? I answer, of very great benefit; for it is no little thing in human affairs to know what to avoid and what is true. And surely we have learnt this much, that, from the very beginning of the plague, all commerce in cattle must be arrested; and that if we are not able to cure the disease, we know at least how to deal with the evils attending it. . . . Should this plague ever recur hereafter, posterity may study these pages with some satisfaction, and certainly with profit."

That Europe was in sore need of the findings of Lancisi may be appreciated from the estimate that in the four years preceding the publication of his findings in 1715, no fewer than 1,500,000 cattle died of rinderpest in western Europe. But Europe, Italy included, apparently preferred to learn the hard way, and in the next half-century, over 200,000,000 fell prey to the invader. Figures the size of which are suggestive of the national debt are best translated into more homely terms: This would represent an annual loss of about 20% of the dairy cattle population in this country over the past 50 years—an annual loss, in the terms of 1950 values, of over $1,500,000,000—a figure close to the net income from all dairy products. It would seem that local reports of complete cattle populations being wiped out are no exaggerations.

Rinderpest in Britain

In 1714 the plague entered Britain, and following the reports of outbreaks of an unknown disease in a number of herds, Thomas Bates, surgeon to the King, was appointed to investigate and make recommendations. While it seems very unlikely that he could have known of the yet unpublished work of Lancisi, the findings and counsel of Bates are closely parallel to those of the Italian. Finding that he could get no help from the local cow-leeches, Bates devised experiments to determine the mode of contagion, and performed autopsies in an effort to learn the nature of the disease. An early recommendation which proved effective in reducing the ravages of the plague was to

divide large herds into small parcels, ". . . by which they lost only that in which the disease happened." The apparent inutility of treatments that had been tried led him to recommend slaughter of the sick and burning or burial of the dead. Fortunately this advice was acted upon with dispatch; the speedy acceptance of this recommendation by farmers was perhaps motivated by the agreement of the government to Bates' suggestion that indemnity be paid for animals slaughtered. This appears to be the first instance of government indemnity being used to implement a control by slaughter program; there is no evidence that this was done in Italy.

What is surprising is that a mutually acceptable plan could be devised within a few weeks after the outbreak of the plague, for the plan obviously contained some unknown elements. The government might conceivably have bankrupted itself had the measure been unsuccessful, and the farmers had the choice of accepting £2 for a cow ill less than 24 hours, or £½ if they hesitated. With ordinary cows worth from £6 to 10, the choice for some may not have been an easy one. For some, the problem appears to have been less weighty, the practice of claiming bounty for worthless, but healthy, animals apparently was conceived when the first greedy individual saw the first properly claimed bounty change hands. A bit of doggerel current at the time runs,

"Some cunning huxters, who had cows
Old, dry, and lean, not worth a souse . . .
These wisely knock'd 'em on the head
By night, when neighbours were in
bed . . .
And claim'd the sum of forty shilling
For every cow of Heaven's killing . . .
A gen'rous bounty, that destroy'd
More cattle than the plague annoy'd."

Whatever the case, the loss of cattle was under 6,000 head, and the bounty amounted to less than £7000, the plague being wiped out in six months. The disease had attacked Holland about the same time, and in three years of temporizing, 300,000 cattle were lost.

The English had learned as little as the Italians however, for the plague was reintroduced in both countries and allowed to run its course. Fleming states, "There appears to have been no Lancisi—no Dr. Bates, to point out the incurable character of the disease, and to suggest that as it spread by contagion alone, so it could only be suppressed by destroying the contagious source."[7] Everyone had his favorite cure; a noted bishop proposed tar-water, and a popular cure on the continent was the liberal administration of wine—often to the extent of 50 to 70 bottles per cow—which must have been most popular with the attendants. The use of purges, cautery, setons, and bleeding became widely employed in the best traditions of the humoral theory of disease, and upon the suggestion of one learned physician, innoculation with infective matter became the rage of the day. Many innoculators, both medical and lay individuals, made huge fortunes before public opinion turned against the practice. A suggestion in the *London Magazine* of 1748, from an individual who identifies himself as "Mulo-Medicus," if it were tried, might represent the first (and probably the last) attempt at intravenous medication: ". . . take half an ounce of salt-petre, and half a quarter of an ounce of tobacco: Boil them a minute or two in half

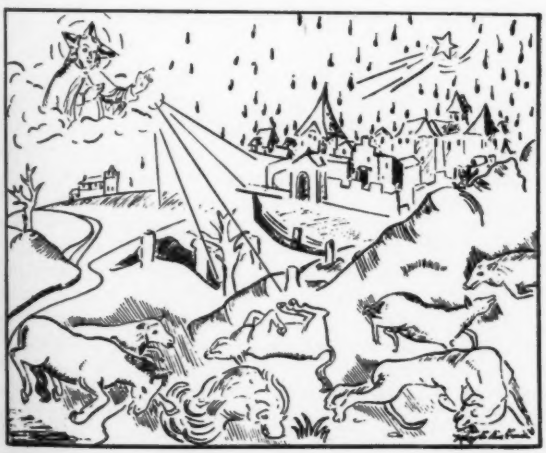

Fig. 3. The plague as a manifestation of divine displeasure, either directly, or via atmospheric disturbances. A synthesis of several 15th century drawings. Figures 1-3 were drawn by Miss Mary Ellen Cross from R. Froehner, Kulturgeschicte der Tierheilkunde.

a pint of water, and let the strain'd liquor be injected, blood-warm, into the neck-vein."

Between 1745 and 1757, 3,000,000 cattle in Britain perished; while the government did intervene with what should have been effective measures, it seems to have been a case of too little and too late, but Mullett says, "Why this epidemic lasted so long and proved so fatal has not been explained. . . . Factors of climate and feeding may have prepared the way for a much more serious onslaught than that of 1714. Such political problems as the War of the Austrian Succession and the Jacobite Uprising no doubt distracted attention from the humble but not less critical ailments of cattle. Veterinary science as represented by the ignorant cow leech was backward. Medical men, even the able, skilful, and willing, had little or no knowledge of comparative pathology . . . (and in some cases) fashionable doctors feared to visit a cow lest they incur 'the filthy appellation of cow-leech'." Coming from a "disinterested" historian, the views of Mullett are worthy of special consideration. Unlike the work of Fleming, which was "compiled rather than composed" by extensive quotation from a few sources, and by "lifting several pages in a block rather than abstracting the entire work . . . disregarded certain materials and viewpoints," Mullett's work is a scholarly classic in the field of infectious disease. In conclusion, he says, "Over a period of a dozen years the distemper excited a very large response. In this response were hundreds of contributions, of which many will confirm the conviction that the medical knowledge and outlook of the day was hopelessly mistaken; others represent a viewpoint that bespoke a more productive and successful era in veterinary science and are therefore clues to its development . . . it has seemed desirable to indicate the total character of veterinary practice at that day and to drive home the full impact of the murrain upon English opinion and society. By and large one may trace a steady development of a more scientific viewpoint during the epidemic. Before its course was run the number of folklore prescriptions declined, and the suggestions marked a distinct advance over the generality of earliest contributions."

The ravages of the cattle plague around the mid-eighteenth century were a major factor which led to the establishment of the first veterinary colleges in Europe, beginning with those of Lyons (1761) and Alfort (1763) in France. While Europe was at no time free of rinderpest after 1710, improvements in sanitary practices beginning about 1770 apparently achieved a considerable degree of success in containing the plague until its eventual eradication in 1880. Thus Europe learned to live with the plague until mastery of it could be accomplished. Due in part to insular segregation and to restrictions on trade, Britain enjoyed a tenuous immunity to the cattle plague for nearly a century. This same immunity, however, resulted in an almost total indifference to the need for newer knowledge of animal disease. Belatedly, and mainly through the efforts of a Frenchman, Charles Vial de Sainbel, the Veterinary College of London was founded in 1792. The school was established upon a sound basis, but almost immediately fell into the clutches of the surgeon, Coleman, who contrived to deprive Britain of an effective veterinary service during his tenure of over 40 years, and for many years after his death in 1839. Coleman not only remained adamant in refusing to teach the diseases of any species save the horse, but also refused to admit the possibility of contagion in diseases the contagiousness of which had long been recognized upon the continent. Unfortunately, the otherwise capable William Dick, founder of the Edinburgh Veterinary College (1823), also had a poorly developed concept of contagion. The veterinary service of Britain was, therefore, completely unprepared for the onslaught of epizootic cattle diseases which began with foot-and-mouth disease (1839), pleuropneumonia (1841), and culminated in a siege of rinderpest (1865).

The veterinarian into whose hands the problem of these epizootics was placed was James Simonds, the newly appointed professor of cattle diseases and a trusted government advisor on veterinary legislation. A firm believer in the spontaneous generation of disease, he apparently foresaw no danger in the popular clamor for free trade which succeeded in opening the channels of cattle trade between Britain and parts of Europe where commerce had hitherto been banned because of the disease situation. Nor is it apparent that he saw any connection between the opening of the ports of Britain in 1838 and the first outbreak of foot-and-mouth disease in 1839; in 1857 he testified before the House of Commons that the disease was not imported, but arose spontaneously. The apprehension over the possibility of the importation of rinderpest was sufficiently great, however, to have Simonds sent upon a mission to the continent to study the problem. In six weeks' time he returned with the report that

"No fear need be entertained that this destructive pest will reach our shores."

If, as a nation, Britain was lulled into a false sense of security with the reassuring words of Simonds, one citizen, the fiery John Gamgee, a veterinarian who also possessed a medical degree, was not impressed. After qualifying at the London school in 1852, Gamgee spent two years studying the plague problem on the continent. He returned convinced that Britain was particularly susceptible to the cattle plague as a result of the free trade in diseased cattle, the expensive luxury of which he clearly recognized. Simonds had extensive connections with the agricultural interests of Britain, which, like the commercial interests, strongly opposed any suggestions that trade in cheap cattle from eastern Europe should be regulated, much less curtailed. In 1863 Gamgee, in a letter to the *Times*, predicted that the plague would be imported and stated unequivocally that it would come from a Baltic port. Upon the defeat of a bill to restrict cattle importation in 1864, Simonds wrote,

"The withdrawal . . . of the Cattle Importation Bill leaves the country in the same tranquil position it enjoyed before sensationalists appeared on the stage. The people of Britain will relish their beef and mutton none the less for the exposure which has been made before the select committee."

A few months later, in June 1865, rinderpest from Russia, via the Baltic ports prophesied by Gamgee, entered Britain, and for two fatal months went unrecognized. When it was finally determined that a contagious disease existed, the government, in what amounts to a well-deserved disregard for the veterinary profession, placed the control of the outbreak in medical hands with an engineer as director of the campaign. In utter disregard of the measures formulated by Bates in 1713, and the fact that these measures had eventually proved successful in the outbreak of 1745, the government refused to prohibit the continued importation of cattle, nor did it make any effective provision for the slaughter of diseased animals. Thus did a nation reap the fruits of indifference toward the problem, the nature and solution of which was already a matter of public record. A short while before the outbreak, Simonds not only remained blind to the dangers of importing diseased cattle, but refused to recommend quarantine at the port cities; should disease break out, he considered it sufficient to quarantine the individual farms.

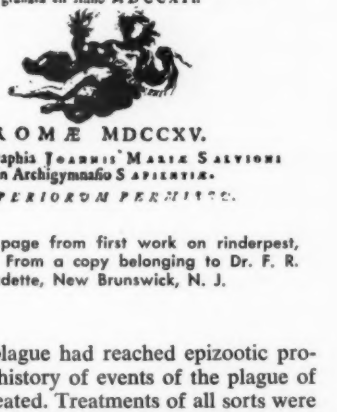
IO MARIÆ LANCISII
A' Secretiori Cubiculo, & Archiatri Pontificii
DISSERTATIO HISTORICA
DE
BOVILLA PESTE,
Ex Campaniæ finibus anno MDCCXIII
Latio importata:
DEQUE PRÆSIDIIS
PER SANCTISSIMUM PATREM
CLEMENTEM XI.
PONTIFICEM MAXIMUM
Ad avertendam aëris labem, & Annonæ caritatem opportunè adhibitis.
Cui accedit Consilium de Equorum Epidemia, quæ Romæ grassata est Anno MDCCXII.
ROMÆ MDCCXV.
Ex Typographia Joannis Mariæ Salvioni
In Archigymnasio Sapientiæ.
SUPERIORUM PERMISSU.

Fig. 4. Title page from first work on rinderpest, Lancisi 1715. From a copy belonging to Dr. F. R. Beaudette, New Brunswick, N. J.

After the plague had reached epizootic proportions, the history of events of the plague of 1745 was repeated. Treatments of all sorts were tried; medical men and lay innoculators made fortunes from useless vaccines, and the public ate diseased meat. One of the most effective means of moulding public opinion was Gamgee's campaign against the sale of the principal byproduct of the plague—diseased meat. Finally good sense prevailed, after the loss of some 200,000 cattle, and the campaign for control of the plague was placed in veterinary hands; the eventual success of this move resulted in the establishment of a veterinary department of the Privy Council, a move which was vigorously fought by the medical profession. It should be noted that if the veterinary profession had been indifferent to the problem of epizootic disease, the medical profession had also, and in addition, was indifferent or even openly hostile to the veterinary profession. If the veterinary profession numbered but one John Gamgee among its ranks, about the only protagonist of the contagion theory among medical ranks was William Budd, who like Gamgee, was ridiculed for his views. Fortunately, both lived to see their

views vindicated, but Gamgee remains "a monument to departmental incapacity and national ingratitude." It should not be concluded that Simonds' actions were deliberately calculated to embarrass the profession; he was a product of the times. It was Gamgee who was ahead of his time, and like the proverbial prophet, was without honor in his own country. It is doubtful that anyone before Gamgee visualized the concept of a disease-free animal population, much less the means for achieving this goal.

It is a matter of more than passing interest that the outbreak of rinderpest in Britain in 1865 caused considerable apprehension in America. A special Committee of the New York State Agricultural Society was appointed in 1866 to investigate the disease and to make recommendations aimed at preventing its importation. The report of the Committee, issued in 1867, stated,

". . . the introduction of this disease into the State of New York, which contains over 2,000,000 of horned beasts and 3,000,000 of sheep, with no sanitary regulations established by law for its suppression, would result, if the ratio of mortality should be equal to that in England, in a loss of at least $5,000,000.

Accordingly a bill was drawn up by the Committee, and "An act to prevent the introduction and spread of the disease known as the Rinderpest . . ." was passed by the legislature. This act provided that the health officer of the port of New York should examine cattle entering the port for rinderpest or other infectious disease and have slaughtered any animals in which the disease appeared within a quarantine period of 21 days. In the event the disease should appear on any farm, if was the duty of the owner to notify the proper authorities, who were empowered to segregate or slaughter and bury as the occasion demanded, to quarantine the premises, and to regulate the movement of animals. One-half the value of the animal was to be paid by the state for animals slaughtered, $15,000 being appropriated for the purpose. A provision for fine or imprisonment was included in cases of noncompliance; a feature which experience has demonstrated to be a necessary part of such legislation.

Adequate legislation on a national scale, of course, is essential to insure freedom from imported disease. So long as a single port of entry remained, it was perhaps as much good luck as good intentions that rinderpest never became a problem. The present philosophy of the veterinary profession, consciously or otherwise, is one of determination that history, as it relates to the animal plagues of the past, shall not repeat itself. The Grosse Isle project might be looked upon as an "insurance touchdown" in a struggle in which we can never become complacent about winning.

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Nutrition and Economics

A significant study was reported in a recent issue of *Feeding Forum* concerning the economic advantage of sound feeding practices.

"When hogs were selling in early December at $11.50 cwt., a farmer could feed his home-grown corn straight, and realize 90c a bushel for the grain. His alternate choice was to feed the corn with tankage and realize $1.20 or $1.25 a bushel. However, if he fed the corn with a good commercial supplement, fortified with all the necessary vitamins, minerals, antibiotics, unidentified growth factors, and other essential nutrients, he could realize easily $1.50 to $1.60 a bushel for the grain."

This should be of practical interest to the veterinarian practicing in hog growing areas. The man who gets $1.50 to $1.60 a bushel for corn is in better position to pay his bills than the man getting 90c a bushel.

The veterinarian who directs his clients on to a sound feeding program helps himself as well as the client.—*Morris Erdheim, D.V.M.*

▼ ▼ ▼

The Fifth Freedom

Rules and regulations we must have. The law, the clock, and the calendar have a big hand in what we do. But there is one privilege we can enjoy without restriction. That is reading. You can read when you choose; stop when you feel like it. Nobody tells you what to read or how much. With a newspaper, magazine, or book, you're free as a bird. You can absorb a paragraph, a page, or the whole works—from cover to cover.—*Phoenix Flame.*

Klebsiella Mastitis In Dairy Cows

PHILLIP M. HINZE, B.S., D.V.M., Carnation, Washington

In this article Doctor Hinze reports clinical observations of an unusual outbreak of mastitis in a large dairy herd. To supplement his investigations, the cooperation of Dr. Frank W. Crews was solicited for laboratory study of the causative organism. Doctor Crews' report follows this and completes a phase of the clinical and laboratory investigation of Klebsiella mastitis.

KLEBSIELLA has recently been added to the list of organisms causing mastitis in cattle. Barnes[1] reported from Iowa on four cases caused by *Klebsiella pneumoniae*, and stated that this organism had been reported in the literature only twice before. Legrait and Leblois reported on one case in France in 1950 and Buntain and Field reported on a series of cases in a herd in England in 1952. Since that time Sacchi[2] has described six cases occurring in two different herds in Maryland.

This small number of case reports of Klebsiella mastitis reported to date would suggest that this organism is of minor importance to the dairy industry. However, experience with infection attributed to this genus in a large herd of registered Holsteins since 1952, indicates that it can be of major importance as a cause of bovine mastitis.

History

On August 2, 1952, a recently fresh cow was found down in the stall, weak, and unable to rise without assistance. Physical examination revealed a slightly swollen left rear quarter, temperature 102F., rumen active, appetite fair, and agalactiae. A tentative bacteriological examination revealed a Gram negative, coliform-like organisms in the infected quarter.

Routine therapy for mastitis at that time consisted of intramammary treatment with penicillin and streptomycin, and sodium sulfamerazine intravenously. In this case, the cow was also given one gallon of 5% dextrose to combat extreme weakness. The cow failed to respond to this therapy and suffered a tremendous loss of weight, loss of the quarter, and agalactiae until calving again, nearly a year later.

Within a week after this case, three other cows in the same barn came down with mastitis, each exhibiting extreme weakness and depression. Therapy was varied on these three because penicillin and streptomycin had failed completely on the previous case. One was treated with furacin ®[1] solution in the udder and streptomycin intramuscularly, one was treated with terramycin ®[2] in the udder and terramycin intravenously, and the third with neomycin in the udder, with no systemic therapy. Treatment was started early in all of the above cases and it was felt that adequate penetration of the quarter was accomplished. The furacin and terramycin treated cows became progressively worse as the first cow had done, losing considerable weight and remaining totally dry for the remainder of their gestations. The neomycin treated cow showed improvement by the following day and continued to lactate in the three noninfected quarters. The infected quarter became functional again at the next lactation.

Shortly following this initial outbreak, 18 cows came down with mastitis, each exhibiting clinical and bacteriological symptoms similar to earlier cases. Neomycin, intramammary, was used as the only treatment on this group. Fifteen responded well to neomycin therapy, two lost the use of one quarter for the remainder of their lactation, and one cow ceased lactating immediately and remained that way until the next calving. Although neomycin therapy was reasonably effective in controlling clinical cases in this outbreak, infection continued to spread sporadically and a few affected animals failed to respond to treatment. Therefore, an attempt was made to determine, if possible, the etiological agent, extent of latent infection, and the source and means of spread of infection.

Etiology

Milk samples are collected routinely on all cases of mastitis in this herd and a tentative bacteriological diagnosis is made. Microscopically, after 24 hours incubation at 37C., milk samples from infected quarters in this outbreak revealed a large number of Gram negative, capsulated, bipolar rods. If the milk sample was taken early in the course of the disease,

®[1]Eaton Laboratories, Norwich, N. Y.
®[2]Chas. Pfizer & Co., Brooklyn, N. Y.

there was only a light leukocytic infiltration but if the quarter was hard, a larger leukocyte count, typical of the response to inflammation, would be present. The Hotis test was used routinely on all cases and the milk would invariably change from a bluish-purple of a normal sample, to characteristic greenish-yellow without colony formation on the side of the tube.

It was assumed that this organism belonged to the coliform group and because the microscopic picture was different from any previously observed in several years of mastitis study, and because a number of cases had failed to respond to rational therapy, Pseudomonas was considered as a possible cause of this outbreak. However, a milk sample from one of the early cases was sent to Dr. F. W. Crews, bacteriology supervisor for the Division of Dairy and Livestock, State of Washington, for positive identification. After due time, the organism in question was reported to be not the suspected Pseudomonas, but a pure culture of a species of the genus, Klebsiella. Since this organism was virtually unheard of as a pathogen in mastitis, a number of milk samples from suspected cases of Klebsiella infection have since been sent to the state laboratory for verification. Each time, the organism has shown cultural and biochemical properties identical to the original, and it has been definitely established as a variant strain of *Klebsiella pneumoniae*.

Extent of Latent Infection

During the inital outbreak, mastitis started in one row of stanchioned cows and began to spread in a rather uniform manner in this one string. However, it was not long until it spread to another string in the same barn, and from here, it appeared sporadically in various parts of the farm. Milk samples were taken on every lactating cow in the herd to determine the extent of the latent infection. Klebsiella was found in one or more quarters in most of the stanchioned cows, in a large portion of the test barn cows where each cow occupies an individual box stall, and even in the few cows that were in the isolation barn, which is located some distance from the main milking barns. It was evident that this organism had established itself rather suddenly in all parts of the farm, in a large percentage of the cows.

The next item for concern was, how soon were the cows harboring this organism going to flare with an acute case of mastitis, and what could be done to prevent this occurrence? It was considered impractical to treat all animals showing latent infection, therefore, it was decided that all positive cows in one string would be treated with neomycin once daily for three days. The remainder of the herd was left as controls. In nearly all cases, milk from the treated quarters was free from Klebsiella infection one week following treatment and it appeared initially that the latent cases should be treated. However, clinical cases occurred in these treated cows, sometimes in the same quarters, at a later date, and this time there was a poor response to neomycin therapy. As the remainder of the herd was observed, it became evident that little was gained from treating these latent infections because most of the cows harboring the organism failed to develop mastitis, whereas Klebsiella mastitis would occur in a few cows as soon as two days after they had been diagnosed negative to the organism.

Subsequent study on the entire herd revealed that a heavy latent infection would generally disappear from a given cow within a three or four week period and that this same cow might again show the organism at a later date. Also, if it appeared in one quarter, it would usually spread to one or more of the others before it left the udder. It became apparent that this organism was constantly going and coming from individual cows and for some reason, yet undetermined, and occasionally it became virulent enough to cause a severe case of mastitis. A common source of infection has never been established, other than the fact that Klebsiella is a colon organism. It is still responsible for over 50% of all mastitis in this herd.

Symptoms

The symptoms of acute Klebsiella mastitis differs in some respects from those of acute mastitis caused by other organisms. The classical case suddenly goes off feed and exhibits extreme weakness, well in advance of any gross changes in the udder. At this time, the body temperature may be normal, or only slightly elevated. If the cow fails to respond to treatment, weakness continues, the quarter becomes hard and the temperature rises to a peak of 105 to 106F. in from five to eight days. Once the temperature becomes elevated, it may remain at 103 to 104F. for several weeks after apparent clinical recovery.

During this period of extreme weakness, most cases show the unique symptoms of upper respiratory involvement, *i.e.*, labored breathing, nasal discharge, lacrimation, a short, hacking

cough, and considerable edema of the eyelids. This condition may continue for one to three weeks, depending upon the severity of the case, during which time the cow ceases to lactate and loses several hundred pounds of weight. Cows producing as much as 90 lb. of milk a day have dried up completely and remained so until they calved again. Others have dropped to such low levels of production that it was economically inadvisable to keep them in the producing strings. Nearly all cows drop in milk production and do not regain it.

Another characteristic symptom is that of extreme mental depression. During the acute phase, the classical case will have long periods when nothing appears to matter. The affected animal will doze or sleep most of the time and if aroused during one of these spells, may get on its feet and walk aimlessly into a wall or any other fixed object. Alternating with these periods of depression are short periods of alertness when the cow will brighten up, be eager for feed, and show considerable interest in life.

Treatment

Treatment has been most successful when 500 mg. neomycin sulfate in ointment form are injected into each infected quarter once daily for three days. Neomycin ointments containing less than this amount have been less successful. Sacchi states that terramycin ointment containing polymyxin B sulfate has shown a higher percentage of recoveries in his practice than has neomycin. Neither of these drugs has proved 100% effective in this herd, however, and drugs other than these have been of little or no value in the treatment of Klebsiella mastitis.

Summary

Klebsiella was first recognized as a cause of mastitis in this large herd of registered Holsteins in 1952, and is currently responsible for about 50% of the clinical cases of mastitis. The organism is routinely isolated from apparently normal udders. Virulence tends to fluctuate, with most acute cases occurring in summer months. A cause for these exacerbations has not been determined and it is still next to impossible to anticipate where and when the next clinical case will appear. Fortunately, the herd has acquired some degree of immunity to Klebsiella because it now occurs sporadically, and not in the form of outbreaks as it did earlier.

Therapeutically, neomycin and polymyxin B sulfate have been most effective in checking infection. Cases that fail to respond favorably to treatment cease lactating and lose an extreme amount of body weight, causing a great economic loss to the owner. However, if a cow is valuable as a producer, or a brood cow, and is carried over until the next lactation, chances of freshening with a normal udder are good. Damage to udder tissue is temporary in most cases.

Prophylactically, little can be done to ward off the infection because to date, clinical infection has not been correlated with any of the usual causes for mastitis, *i.e.*, trauma, improper milking, or lack of sanitation. A common predisposing factor or factors has never been recognized.

Klebsiella pneumoniae has definitely been established as a cause of bovine mastitis, and in some areas is cause for concern. Information is forthcoming which indicates that this organism is not confined to just a few cows in a given area as the literature now suggests; it has now been recognized as an important cause of mastitis by several different authorities, widely separated geographically. Therefore, *Klebsiella pneumoniae* should be considered as a possible etiological agent in any case of mastitis caused by a Gram-negative, capsulated organism which is not readily identified by the usual cultural and biochemical procedures.

REFERENCES

1. Barnes, L. E. Four cases of Bovine Mastitis caused by *Klebsiella pneumoniae*. *Jour. Am. Vet. Med. Assn.*, 125:50 (July), 1954.
2. Sacchi, Edward M., personal correspondence.

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Pure Culture Properties of Klebsiella Organisms Derived from Cases of Bovine Mastitis

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Seattle, Washington

Specimens from typical cases of mastitis which have been described were received at the laboratory of the Division of Dairy and Livestock of the Washington State Department of Agriculture on August 7, 1952; September 11, 1952; July, 1953; August 27, 1954, and September 12, 1955.

In every instance the microscopy of the secretions from the udders of the infected cows revealed the same type of bacteria. Dense populations of bacilli of uniform morphology were observed by microscopic examinations of smears stained by methylene blue and giemsa methods. The cells appeared to be approxi-

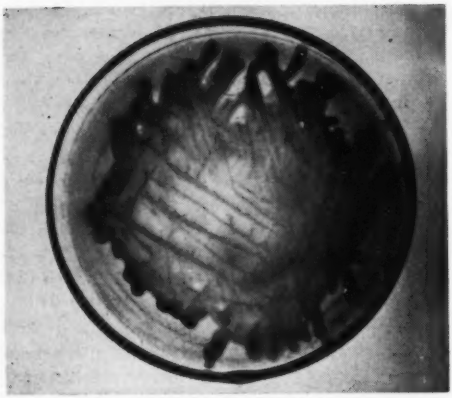

Fig. 1. Illustrating thick spreading mucoid growth of a 16-hour culture of the Klebsiella organisms on violet red bile agar at 37C. incubation.

mately 1 x 2-4 microns with well rounded ends which sometimes presented an ovoid appearance. A pronounced capsule surrounded the cells and this was characteristic of the organisms in all specimens. The bacilli in the specimens stained Gram negative.

Primary isolations from the mastitis secretions on differential media always showed a heavy mucoid spreading growth in less than 24 hours at 37C. A thick dark mucoid growth without a green sheen formed on EMB agar and inoculations on violet red bile agar always resulted in a mucoid growth which spread over the entire surface of the medium during 24 to 48 hours of incubation. Incubation of the inverted petri dish cultures often resulted in a migration of the mucoid culture down the inside wall of the dish. Organisms related to the coliform group were immediately indicated in each specimen. Sub-cultures to brilliant green bile lactose broth fermentation tubes resulted in volumes of gas of 50 to 60% of vial volume at 48 hours of incubation at 37C. Similar volumes of gas were developed in standard lactose broth fermentation tubes by the cultures.

All cultures of the Gram negative bacilli have shown the same biochemical properties. Stock cultures maintained for more than two years on solid media have retained all properties of the original cultures. Stock cultures have retained pathogenicity for mice and organisms recovered from them have remained unchanged in pure culture properties. A pronounced capsule formation by the bacterium was constant on solid media and in fluid media cultures incubated at 37C. A thick spreading mucoid growth was prevalent in young and old cultures.

Pure culture properties which established all cultures as a species of Klebsiella are listed below for incubations at 37C. for 48 to 96 hours.

Staining reaction: Gram negative; non-sporulating.
Morphology: Short bacilli with well rounded ends sometimes appearing ovoid. Approximate size of 1 x 2 to 4 microns.
Capsule formation: Very pronounced large capsule.
Motility: Non-motile..
Violet red bile agar: Initially red colonies in less than 24 hours becoming cream colored; growth heavy and viscid.
EMB agar: Dark viscid growth; sheen not formed.
Brilliant green bile lactose broth: 30 to 40% volume of gas formed at 24 hours.
Lactose broth: Gas volume 30% within 24 hours.
Thioglycollate broth: Dense, thick viscid growth.
Vial infusion broth: Thick, viscid growth in upper 20%.
Russell agar: Acid throughout.
Triple sugar iron agar: Acid and gas formed; H_2S not produced.
Methyl red test: Negative.
Voges-Proskauer test: Negative.
Indole test: Negative.
Citrate utilization: Strongly positive.
Blood agar: Gradual utilization of red cells.
Litmus milk: Reduced, coagulated, acidified slowly peptonized.

Fig. 2. Illustrating thick spreading mucoid growth of a 16-hour culture of the Klebsiella organisms on eosin methylene blue agar at 37C. incubation.

Nitrate test: Positive (nitrates reduced).
Nutrient gelatin: Not liquefied; gelatinase not produced.
Nutrient agar slope: White to grey; heavy growth; glistening.
Urea test: Positive; urea utilized.
Potato slope: Thick, slimy, grey to cream colored growth.
Glucose: Fermented to acid and gas (70%).
Lactose: Fermented to acid and gas (100%).
Sucrose: Fermented to acid and gas (50%).
Maltose: Fermented to acid and gas (60%).
Mannitol: Fermented to acid and gas (20%).
Inositol: Acid and gas.
Glycerol: Acid.
Raffinose: Acid and gas (50%).
Rhamnose: Fermented to acid and gas (10%).
Arabinose: Fermented to acid.
Xylose: Fermented to acid and gas (70%).
Trehalose: Fermented to acid.
Salicin: Fermented to acid.

Pathogenicity: Mice inoculated intraperitoneally with 0.1 ml. of a 24-hour broth culture died in less than 24 hours. Cultures of microorganisms recovered from the essential organs of the mice exhibited properties identical to the original cultures.

It was observed that the cultures from mastitis cases always showed properties which have been considered characteristic at this laboratory of the genus Klebsiella. Lactose fermenting, Gram negative, non-sporulating, non-motile capsulated bacilli were common to all cultures. All cultures initially examined

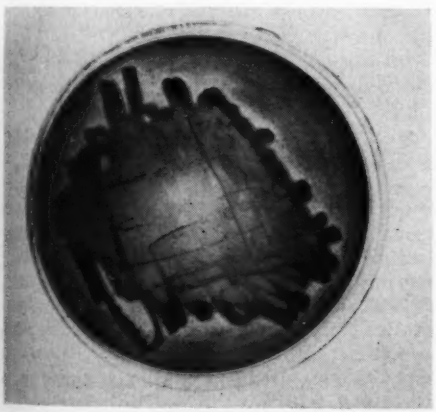

Fig. 3. Illustrating thick spreading mucoid growth of a 16-hour culture of the Klebsiella organisms on yeast extract tryptone glucose agar at 37C. incubation.

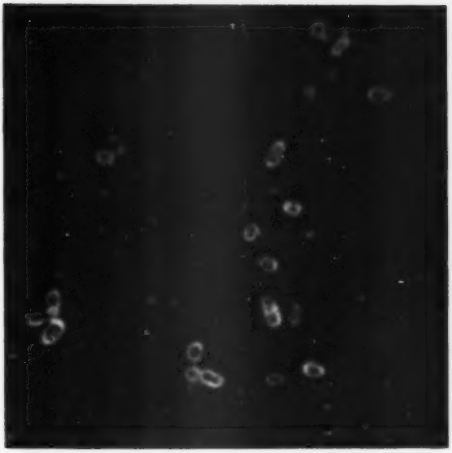

Fig. 4. Microscopy illustrating a variant type of Klebsiella pneumoniae isolated from an early case of acute bovine mastitis. Cells are approximately 1 x 2-4 microns with well rounded ends which sometimes present an ovoid appearance. Note pronounced capsule surrounding each cell. Specimen stains Gram negative.

showed the same basic biochemical properties; namely, failure to liquefy gelatin, indole negative, methyl red negative, Voges-Proskauer negative, citrate utilized, nitrates reduced, urea split and hydrogen sulfide not produced.

Differentiation of the Klebsiella and Aerobacter organisms is not clearly defined in Bergey's Manual of Determinative Bacteriology, 6th edition. There have been numerous recent publications which have reviewed the classification of the Klebsiella — Aerobacter group. An excellent comprehensive study of this group of bacteria was reported by Edwards and Fife.*

Determinations of biochemical properties and capsular types of 756 cultures of the Klebsiella — Aerobacter group were employed in the research. They divided the cultures into 128 motile and 638 non-motile strains. It was pointed out that there is no satisfactory method to distinguish between *Aerobacter aerogenes* and members of the genus Klebsiella. Further, no single biochemical test or combination of tests sufficed clearly to distinguish the genus Klebsiella and *A. aerogenes* from cultures of *Aerobacter cloacae*. The classification of the group was considered and motility and gelatin liquefaction were found most

(Continued on page 296)

*Edwards, P. R., and Fife, Mary A., Studies on the Klebsiella-Aerobacter group of Bacteria. *Jour. Bact.*, 70:382, 1955.

Advances Made In Swine Practice

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Part VI: Brucellosis

Readers are referred to VETERINARY MEDICINE 50:565 (Nov.), 1955; 50:683 (Dec.), 1955; 51:33 (Jan.), 1956; 51:61 (Feb.), 1956; and 51:102 (Mar.), 1956 for parts I to V inclusive of this series pertaining to important diseases of swine.

Procine brucellosis is not alone a serious disease entity having material influence on the swine industry but a significant zoonoses; swine brucellosis is transmissible to man. Further importance is attached to existence of this disease among swine considering the present concentrated efforts of the bovine brucellosis eradication campaign and the pressure exerted that fluid milk be supplied only from Brucella-free herds.

In this article, Doctor Smith reviews much of the work that has lead to the present understanding of brucellosis in swine and points out missing parts of the necessary formula for adequate control.

A comprehensive reference list is appended.

VETERINARY literature contains an abundance of information pertaining to swine brucellosis. Many theories held by veterinarians in early years have been proved by research. Some have been discarded. Changes of opinions have been frequent, but knowledge of the disease process has been gained. Brucellosis in swine is a serious disease entity and little is being accomplished toward eradication.

R. A. Craig reported (1905) the first case of malta fever in man in the United States. In 1911, a disease in man was recognized as caused by *Brucella melitensis* which was acquired from goats.

Early Findings

Alice Evans, in 1918, established the relationship of *Br. melitensis* and *Br. abortus*. From 1918 to 1922, there was manifest great interest among veterinarians as to the cause of abortion in swine. The agglutination test was being employed as an aid in diagnosis. Commercial firms were manufacturing Brucella bacterins, and many practitioners were using this biological product in an attempt to prevent spread of disease in selected droves. In some cases, results appeared to be satisfactory. Phenol in the drinking water was also being used, both as a preventive and cure. It was entirely empirical.

Jacob Traum[1] (1913) isolated the first *Brucella suis* organism from an aborted swine fetus. At the time he was not able to distinguish species type.

Drs. Connoway, Durant, and Neumann[2] discovered that the serum of sows which were aborting reacted to the serological tests using the same antigens as were used for testing cattle.

Good and Smith[3] isolated *Br. suis* from an aborted swine fetus and from the placenta. Abortion was the problem leading to study of this herd.

J. W. Connoway *et al.*[4] reported (1921) that swine brucellosis could be eradicated from any drove by blood testing, isolation of infected animals, and proper disinfection of premises. F. B. Hadley and B. A. Beach[5] also recommended a program of test, isolation of reacting sows, and vaccination of open, negative sows.

Study of Serological Test Results

In 1923, H. M. Weeter[6] reported the incidence of brucellosis in swine as determined by agglutination tests, in dilutions of 1:40 or higher in sows, to be 23.7%. Blood was obtained from hogs killed at slaughter in a Chicago packing plant.

R. A. Craig[7] was the first to suggest segregation of pigs from infected sows at weaning time.

R. R. Spencer[8], as early as 1930, found that it was a common occurrence in Brucella diagnostic agglutination tests, that a negative test in test tubes containing high concentrations of serum may be due to an excess of antibody rather than to its absence. There is a possibility that this information had a direct influence on the idea that only animals that gave a positive test in dilutions above 1:100 were infected animals.

H. W. Johnson and I. F. Huddleson[9] believed that abortions in swine were not great, although many pigs were still-born. Sterility was a problem. Twenty-five per cent of the serum samples tested reacted in titers of 1:25

*Allied Laboratories, Sioux City, Ia.

or more. They concluded that brucellosis was not an abortion disease but affected the lymphatic system chiefly.

Test results of a rather extensive survey were reported by Murray *et al.*[10] (1931). Rate of infection, using the dilution of 1:40 or higher as positive, was determined among classes of swine in droves where husbandmen were reported ill of undulant fever as follows: Gilts 2.8%; sows 4.2%; and barrows, 1.8%.

H. W. Johnson *et al.*[11] could not correlate culture findings with agglutination titers. Low titer reactions were not easy to interpret.

According to I. Forrest Huddleston *et al.*[12] 7.7% of swine reacted to brucellosis in dilutions of 1:40 or above.

F. M. Hayes[13] stated that brucellosis in swine was an infectious disease that may remain latent for a time and suddenly develop virulent manifestations. All of the methods by which *Br. suis* might be spread from one hog to another had not been established, except indirectly. It was known by direct experiment that entrance of the organism with agglutinin response may take place through the conjunctiva, skin, and mouth. These were considered to be the usual natural routes of infection.

Creech[14] isolated *Br. suis* in pure culture from an abscess situated at the base of the brain of a hog.

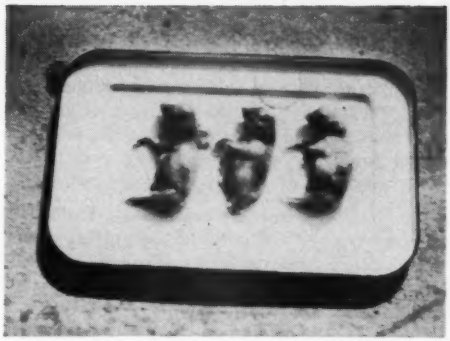
Paul Kabler and Margaret MacLanahan[15] reported that the Brucella strains isolated in Minnesota from human cases of undulant fever indicated *Br. suis* to be the etiological agent about twice as ofen as *Br. abortus*.

Lyle Vezaie and K. F. Meyer[16] found that all cultures classified as suis type by biochemical reactions fall into the abortus type antigenically.

In 1936, Frank J. Jirka[17] reported that the first serious outbreak of Brucella infection in swine occurred in Illinois in 1922.

M. Steffens[18] presented data to show that the intradermal test for swine was not satisfactory because it detected only one-half of the infected swine.

F. M. Hayes[19] called attention to the fact that many individual swine show no apparent clinical manifestations of brucellosis. One of the important characteristic symptoms was the premature birth of the entire litter which occured usually early in pregnancy. Sterility was quite common. Orchitis in the male was recognized along with stiffness, lameness, arthritis, and metritis in sows. A high percentage of swine blood samples gave positive agglutination tests in low dilutions. Attempts to produce a skin test were not satisfactory.



Aborted swine fetuses from which Brucella suis was isolated.

S. H. McNutt[20] stated that measures which apply to control of brucellosis in cattle were applicable to swine.

The Report of the Chief, Bureau of Animal Industry (BAI) 1938, indicated that some benefit may have been derived from the use of prontosil® in cases of undulant fever in man. Attempts to cure cases of *Br. abortus* in cattle with this agent, and sulfanilamide were unsuccessful.

Alex Thomsen[22] reported that a product called "abortin," when injected into the layers of the skin, produced a local enlargement in from 24 to 48 hours in affected swine but no reaction occurred in noninfected animals.

A. T. Kinsley[23] recognized the fact that virulence of the organism or the resistance of swine to infection varied. It appeared more destructive in some droves than in others.

The University of Illinois circuular 1046, 1940[24] stated that the disease was introduced into healthy herds through the purchase of apparently healthy gilts, sows, or boars. Condemnation of reactors to the blood agglutination test was the important step in eliminating infection. There was no preventive or cure for the disease.

H. H. Ruhland and I. F. Huddleson[25] reported that one species of cockroach and several species of flies, such as the house fly, blow fly, and the stable fly, were possible vectors. They showed that, after feeding on virulent infected material, flies excrete viable organisms in their intestinal droppings for four days and possibly longer.

In 1941, John R. Mohler, then Chief of the

®Winthrop Laboratories, New York, N. Y.

BAI[26], called a conference in Chicago of several research men from Iowa, Minnesota, Michigan, Indiana and the Bureau for the purpose of developing and assigning projects on swine brucellosis to various experiment stations most suitably located and equipped for the purpose. The studies were to develop improved methods of diagnosis and control.

The reports from Michigan State College[27] indicated that on the basis of the agglutination test incidence of porcine brucellosis was 1.1%. Purebred swine breeders were beginning to demand Brucella-free herds.

Farmers Bulletin 1871[28] stated that the test and slaughter method was the most effective means by which the disease may be controlled.

I. Forrest Huddleson[29] developed a culture filtrate which he called brucellin which was to be used as a treatment for human brucellosis. Following its use on over 3,000 cases, they found that it did not alter the course of the disease in all cases.

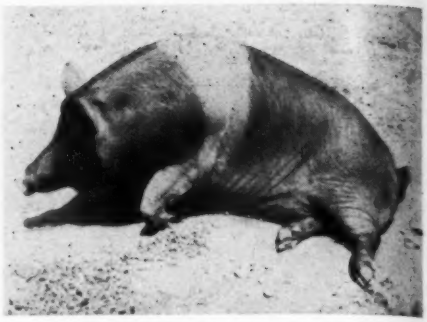
H. S. Cameron *et al.*[30] presented their results as evidence that resistant stock were not carriers of *Br. suis* and that their genetic constitution was an ability to resist infection of the organism rather than an inability to produce agglutinins against it.

W. L. Boyd *et al.*[31] reported an incidence of 12.2% of swine blood positive in dilution of 1:40 or above in sows and gilts and 12.6% in barrows of animals coming to the South St. Paul stockyards.

B. N. Carle and Wm. H. Dewhirst, Jr.[32], developed the method of bleeding swine by way of the anterior vena cava. Up to this time most swine were bled by piercing one of the veins in the ear or cutting the vein in the tail, or completely severing the end of the tail. Many veterinarians today use the method as outlines by the authors. This was progress.

L. P. Doyle[33] found that the rate of abortion in droves may decline rather rapidly in consecutive pregnancies in infected sows but infection often persists after abortions cease. Infected animals are sources of infection.

The work of H. S. Cameron *et al.*[34] revealed favorable results in the development of a Brucella-resistant strain of swine. Autopsy of some animals showed that resistance was an ability to resist Brucella organisms and not an inability to produce agglutinins. Positive cultures were obtained from the submaxillary lymph glands one or two months after inoculation, indicating that tissue invasion had occurred. However, the resistance of the host had prevented further invasion.



Posterior paralysis in sow associated with *Br. suis* infection of the vertebrae.

The A.V.M.A. Committee on Brucellosis in Swine[35] (1943) reported that the knowledge of Brucella infections in swine from controlled experiments and from experience with natural outbreaks was inadequate. No definite control procedures which were known to be satisfactory were available. They made several suggestions regarding testing, isolation, and cleaning procedures.

H. S. Cameron *et al.*[36] used a herd of inbred Berkshire pigs which they thought were resistant to brucellosis. When this inbred group were exposed to *Br. suis* by feeding the organism, they were found to be resistant to brucellosis.

S. H. McNutt and T. S. Leith[38] called attention to the fact that Brucella infected sows may abort from causes other than *Br. suis* infection. Most Brucella infected sows do not

Brucella orchitis in a purebred Poland China boar. This is an exaggerated case. Usually the disparity in the size of the affected and the non-infected testicle is not so great. The agglutination titer of this animal at the time the photograph was taken was 1:25,600.

always abort. Sale of infected herds and attempted purchase of clean breeding stock is permissible only if the new stock can be proved beyond doubt to be free and if quarters free from contamination can be assured.

The Public Health Service[38] estimated that 50% of brucellosis in man was due to *Br. suis*. Swine infection could be transmitted to cows where it might localize in the udder. *Br. suis* might survive for long periods in dark, damp hog houses. It was not resistant to direct sunlight and was destroyed by most disinfectants.

Hugh S. Cameron[39] suggested that the complete absence of agglutination in all dilutions in the group with negative histories strongly suggests that a reaction in the 1:25 dilution is specific and should be regarded as evidence of exposure.

W. S. Stone[40] reported that, up until 1941, no positive serological test for brucellosis in swine was found in New York state. He suggested that a serum titer of 1:50 or higher may safely be regarded as indicative of infection in swine. *Br. suis* has been isolated repeatedly from swine having a maximum titer of 1:25.

The cause of the act of abortion in sows should always be investigated[41] because all abortions are not due to *Br. suis*. Any febrile condition, such as acute indigestion, pneumonia, hog cholera, influenza, erysipelas, swine pox, and leptospirosis, may result in premature births. Rough handling of the pregnant sow has always been a factor in abortions. Often Streptococcus and Corynebacterium infections have been incriminated in sporadic outbreaks.

L. M. Hutchings *et al.*[42] were working with a new method of diagnosing brucellosis in swine. The diagnosis by means of the agglutination test had certain inaccuracies which had led to the trial of some chemical fractions of *Br. suis* intradermally. Five different materials were used experimentally. They concluded that intradermal testing would have the definite handicap of skin pigmentation interfering with erythema manifestations which must be considered in the interpretation of reactions.

L. M. Hutchings' survey[43] showed 20% of the hogs in some sections to be infected. Evidence indicated that incidence of the disease was on the increase. The percentage of abortions was usually greater in gilts than in sows. If sows or gilts were exposed at the time of breeding or shortly afterwards, pregnancy was more likely to terminate in abortion. *Br. suis* may be isolated from the semen of boars. Positive agglutination tests in young swine may come as a result of ingestion of colostrum from the sow and may not be evidence of active infection.

Grace P. Kerby *et al.*[44] isolated *Br. suis* from a naturally infected hog. Infection was established most easily in animals receiving intravenous inoculations of viable organisms. Agglutination titers tended to remain high throughout the course of experimental inoculations with Brucella, regardless of inoculation route employed.

W. S. Stone[45] found that *Br. suis* infection in swine may produce abscesses in the liver, spleen, and bones of the spinal column. In addition, a severe and destructive arthritis of the pastern and fetlock joints is common. The organism may localize in the testes, epididymis, and seminal vesicles of the boar, which frequently is a spreader of infection. Infected sows do not always abort.

H. S. Cameron and P. A. Carlson[46] found that swine brucellosis could not be eradicated from heavily infected herds by blood testing and segregation alone. They suggested the blood test be run in dilution of 1:25.

L. M. Hutchings[47] estimated the prevalence of swine brucellosis, based on slaughter house surveys, to be between 1 and 3% of the hogs slaughtered. In the breeding herd, better results could be expected if the infected animals were disposed of promptly when the pigs were weaned.

E. Sanborn[48] stated that it appeared there were as many disseminated lesions in the genital tract in man as there were in susceptible animals. Orchitis may occur in man as a localized genitourinary lesion.

L. M. Hutchings[49] called the attention of veterinarians to the fact that it was imperative that a complete test of all breeding swine in a herd should be conducted rather than selecting a few individual animals for test as a criterion for determining disease status of the herd. Frequently, swine from which *Br. suis* was isolated from blood and body discharges would react only incompletely at the 1:25 dilution of blood serum. Swine blood serum should be tested in low dilutions.

The Brucellosis Committee of the A.V.M.A.[50] reported that, because of the severity of *Br. suis* infections and its comparative frequency of occurrence in man, swine brucellosis was not properly recognized as one of the important transmissible diseases

of animals. They recommended frequent herd blood tests.

According to the report of H. S. Cameron and P. A. Carlson[51] pigs may become infected with *Br. suis,* exhibit bacteremia, yet fail to react to the agglutination test in dilution of 1:6.25. They maintained that the absence of agglutinins before exposure and after recovery suggested that a reaction at a low dilution in swine was specific and was evident of exposure to the organism. The absence of agglutinins did not mean that an exposed animal had remained healthy. Positive blood cultures were obtained in experimentally infected pigs negative to the agglutination test in dilution of 1:6.25.

John D. Call[52] reported on two human cases of Brucella endocarditis involving the aortic valve. It appeared that such cases were not reported more often because of the frequency of Brucella infections in the general population.

L. M. Hutchings *et al.*[53] called attention to the fact that a few supposed facts concerning swine brucellosis needed to be re-examined because the literature was contradictory in regard to mode and duration of infection, age incidence, and agglutination response. He stated that we must know how to consistently infect swine so that we may clearly evaluate findings. Their experiments demonstrated that a high percentage of unrelated pigs were readily infected at weaning age. Other investigators were of the opinion that such pigs were not readily infected. Gilts infected with *Br. suis* at weaning age (12 weeks) failed to exhibit symptoms of abortion at the end of their pregnancy. *Br. suis* was not isolated either from sows or from their pigs at the time of birth.

H. C. Smith[54] reported on the use of an autogenous bacterin prepared from bacteria isolated from swine feti during a storm of abortions in one drove. Three 5 cc. doses of this bacterin were administered subcutaneously at intervals of ten days. Sows were rebred to the same boars. The bacterin failed to prevent the act of abortion in vaccinated animals. Sows and gilts were bred to positive boars and their semen contained *Br. suis* organisms. This was more than a fair test of immunity if any had been established by the use of the bacterin.

At a panel discussion presented by veterinarians[55] it was estimated that from 1 to 4% of cattle infection was due to the swine strain. A survey in Iowa showed that 2.5% of all swine were affected. Various drugs and chemical agents used for the control of this disease have been of no value. Boars were considered to be the greatest factor in the spread of the disease.

Fig. 1. Chronic lesions of swine brucellosis are relatively easy to identify. Br. suis was isolated from the lesions on the spleen. Corresponding lymph glands did not show lesions.

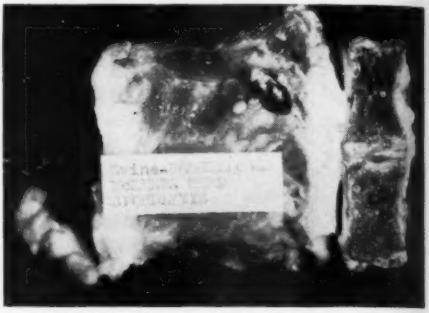


Fig. 2. Spondylitis is common in some Brucella infected herds. Specimen are from one of many gilts in a herd that exhibited symptoms of stiffness and lameness. These were essentially similar to those observed in erysipelas except that none were obviously ill, appetites were good, and there was no apparent rise in body temperature.

Fig. 3. Specimen from Iowa packing plant. Br. suis isolated from the lesions. This animal also gave a positive serological test for brucellosis.

The Report of the Chief, BAI[56] (1945) stated that, on the basis of experimental and field results, it was apparent that intravaginal exposures were probably responsible for most early abortions. The results of artificial, as well as natural, exposure studies, in which infected semen had been used to breed healthy sows, demonstrated that this method could transmit swine brucellosis.

Ivan W. Brown *et al.*[57] reported that hogs were highly resistant to experimental *Br. suis* infection; they survived repeated large doses of the organisms given either intraperitoneally, intravenously or by feeding. The site of injury in the pig varied with the route of infection, but the reticulo-endothelial system appeared to be regularly affected. The organisms could be recovered from the lymph nodes as long as 131 days after intravenous inoculation and in the absence of clinical disease.

There was every indication[58] that restocking from infected parent sources must be handled through female replacement offspring rather than males. Infected semen transmitted active cases of brucellosis in 70% of susceptible sows. The rates of infection from eye exposure was 83% and from oral exposure, 66%. Failure to maintain unquestionably clean breeding boars will endanger any program designed to control swine brucellosis on a herd basis. This work again confirmed the potential danger of an infected boar in any control program.

L. M. Hutchings *et al.*[59] showed that maintaining a herd of Brucella infected sows and boars is not profitable. All pigs raised from infected sows do not contract the disease as suckling pigs. Some suckling pigs may acquire positive blood titers, but this may be due to the passive transfer of agglutinins from the sow's milk. It was their experience that, if the agglutination response in weanling pigs persisted for more than one month after weaning, the pig should be considered as possibly infected.

F. N. Andrews and L. M. Hutchings[60] examined 53 samples of semen from six naturally infected boars. Collections were made in an artificial vagina. The average size of 25 litters sired by four of the Brucella infected sows was 5.6 pigs which was definitely smaller than average size litters.

L. M. Hutchings[61] believed that some cases of posterior paralysis in early farrowing sows may be due to brucellosis. Lesions were usually found in the spinal column along the lumbar region. These enlargements developed as localized areas of infection, with incoordination in the hind quarters. *Br. suis* organisms may remain alive for four months in soil and river water. The disease may persist in boars for as long as two and one-half years. In boars, the enlargement of the testicle is present in the acute stages of the disease, while, in chronic cases, testicles may atrophy.

H. C. H. Kernkamp *et al.*[62] emphasized the importance of orchitis in boars and the dissemination of infection to sows during copulation. They injected material from the boar's diseased testicle into guinea pigs and recovered *Br. suis* organisms from the spleen. Their report showed that an 11-year-old boy contracted undulant fever, probably by association with infected swine.

Discharges from the genital tract of sows was reported by Hutchings[63] as an important means of spreading infection. As a rule, discharges clear up promptly, but, in brucellosis infection, they may be evident for 8 weeks. Agglutination reactions may disappear rapidly but reinfection may recur. Boars appear to be more susceptible than bulls. *Br. suis* may be carried in river water. Transmission is usually by breeding but may be by contact. Swine develop a bacteremia. Organisms may circulate in the blood stream from 30 to 120 days, after which they become established in all the tissues of the body. Orchitis in boars is a good symptom. Abortion may occur at any time after 21 days of breeding, which adds to difficulty in diagnosis.

H. S. Cameron[64] described three possible segregation units as a means of controlling brucellosis. First, group segregation on the basis of exposure to brucellosis and not on the basis of individual reaction to tests. Second, a positive unit contains reactors of breeding age and also negative animals of that age that have been exposed to infection by association. Third, the negative unit containing no animals showing a titer higher than 1:25.

Of 19 sows previously exposed to *Br. suis* as weanling pigs and re-exposed by intravenous or subcutaneous injections during their second pregnancies, Hutchings *et al.*[65] found that 13 became reinfected as evidenced by increases in agglutination titers and recovery of *Br. suis* from blood. No abortions were observed in this group. These workers concluded from their experiments, that hogs previously exposed to *Br. suis* by either natural or artificial means were not as responsive to a second exposure as unexposed swine of comparable ages to first exposure, but resistance or tolerance in these

previously exposed animals was not sufficient to prevent re-infection.

The opinion was expressed[66] that test, segregation, and slaughter methods should be adhered to until such a time as a vaccine may be developed which is not infectious for man and which has been demonstrated to have real merit.

L. M. Hutchings[67] pointed out that herd testing of adult swine rarely reacted in dilutions 1:25 and 1:50. They considered such reactions as suspicious, provided there were definite high titered animals in the herd. If no animals react in high dilutions, then the lower titer reactions may not be of significance.

L. N. Morin[68] reported his observation that it was sometimes impossible to develope a brucellosis-free herd of cattle until hogs on the premises had been tested and reacting swine removed.

Diagnostic Tests

Diagnostic tests, in addition to agglutination tests, have been suggested for diagnosis of both human and animal brucellosis. A. L. Delez *et al.*[69] reported extensive investigation in an effort to develop a practical intradermal test. A state of allergy was demonstrated by means of two fractions of *Br. suis* organisms sensitized as a result of exposure to natural and artificial infection. One of these fractions was a soluble nucleoprotein (SNP) of the bacterial cell. Another was a purified Brucella protein (CA) prepared by repeated acid precipitation of the filtrate of the organisms grown on liver broth. The (SNP) material produced more skin reactions than the (CA) in nonsensitized pigs. Injections of the material into the skin produced a rise in the agglutination titer but it was only of short duration.

S. S. Elberg and H. N. Glassman[70] studied ability of protective substances to stabilize viability and virulence of *Br. suis*. They found that an aerated broth culture stabilized by the presence of dextrin and stored at 20 to 25 C. for 175 days retained 25% of its original viable cell count and 100% of its virulence. This information should help in the production of a potent live culture vaccine for swine brucellosis.

L. M. Hutchings and F. V. Washko[71] reported on four years of experience in attempting to control swine brucellosis in naturally infected farm herds using the standard agglutination blood test as the sole diagnostic agent. Their results indicated that a system of test and segregation of negative pigs from infected parent stock furnished a satisfactory method of control. The work was based on the agglutination test as a means of diagnosis and the absence of infection in many pigs at weaning time.

H. S. Cameron[72] showed that there is a strong tendency toward recovery if exposure to reinfection is avoided. His experience indicated that some animals failed to react to the blood test despite heavy exposure to infection.

Further studies of brucellosis in swine[73] have revealed that a significant number may become permanently infected and that both males and females may eliminate *Br. suis* in the semen, urine, vaginal discharges, and milk during the time animals are used for breeding purposes. *Br. suis* infection in sows does not remain long in the genital tract; however, in several sows, infections persisted for three years and in the semen of one boar for four years.

A. B. Crawford and C. A. Manthei[74] proved that a vaccine made with *Br. abortus* strain 19 would not immunize swine against *Br. suis* infection.

The use of *Br. suis* antigen in the test on swine had no advantage over *Br. abortus* antigen, according to Cameron[75]. The routine test will not identify species. Cross infections can occur without acute symptoms becoming apparent. A transitory blood titer may develop and the animal shed the organisms. *Br. abortus* may produce low titers in swine.

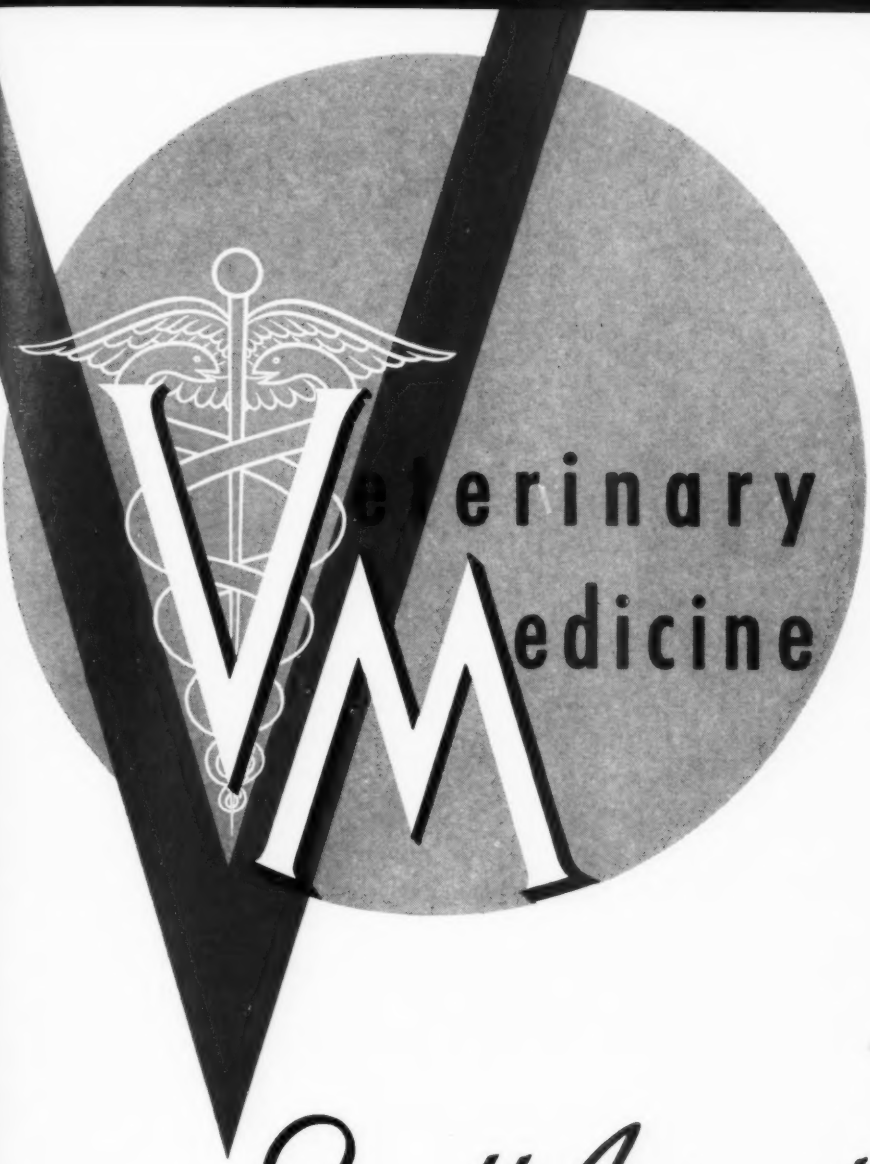
Zaki Morcos of Cairo, Egypt[76], reported cases of Brucella infection in swine in which the pigs were farrowed at full term but were born blind. Most of these died within a week.

High mortality rates[77] in certain droves, where symptoms were more or less obscure, occasionally were definitely traced to brucellosis. Certain symptoms of a respiratory disease were also traced to Brucella infection.

Immunity Studies

Summary of the work of the Bureau of Animal Industry was reported by Manthei[78] covering the period 1941 to 1947. In one experiment, 30 six-month-old gilts were vaccinated with a vaccine made with *Br. suis* (King no. 8) strain. Twenty pigs were given 10 cc. and five, 5 cc. subcutaneously. Five pigs were given vaccine intradermally. Two received 0.2 cc. and three received 1 cc. The postvaccinal agglutination titer on the seventh day was positive in 1:800 dilution. Seven

(Continued on page 285)



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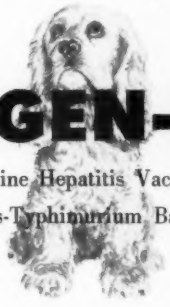

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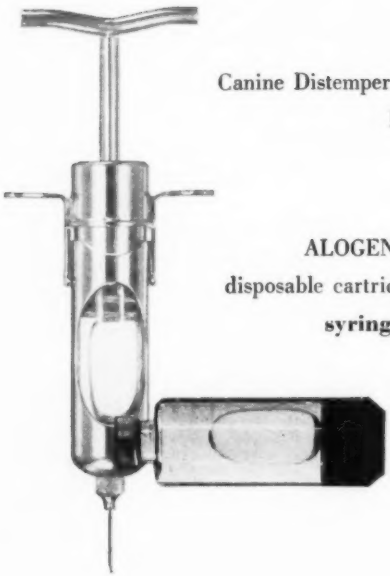

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Radical Amputation Of The Posterior Appendage

FRANK A. HAYES, A.B., B.S., D.V.M.; EDWARD M. JORDAN, D.V.M., and ELDRED W. CAUSEY, D.V.M., Athens, Georgia

COMPULSION for radical removal of an appendage is fortunately rare; however, under aberrant circumstances, this type surgery is often the choice for avoidance of disastrous sequela [1, 2, 3].

The original objective of this preliminary study was an exploration of technics to be employed in the event a coxafemoral disarticulation should be indicated. In view of a recent report on the amputation of a dog's scapula and the favorable results to be expected[3, 4], a similar study involving the posterior appendage has been considered worthy of recount.

Previous planning for the proposed investigation called for the utilization of normal, experimental animals. The subjects were assumed to have an irreversible pathological syndrome affecting either the proximal extremity of the femur or the proximal musculature of the posterior limb, thus necessitating what shall be termed a *lateral approach* or a *medial approach* as the surgical intervention required for correction. After completion of only one experimental exercise, further opportunity for development of technic was unavailable; shortly following the initial operation, two clinical cases were received, whereby a need for both procedures was necessary. As a result of the gratifying termination of each approach, additional work with normal subjects was discontinued. Recently, a third indication for the operation was demonstrated and required surgery initiated with a minimum of complications.

This report consists of a condensation of the

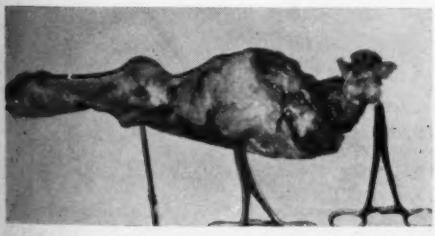

Fig. 1. Removed appendage. Note extensive trauma and tissue necrosis (case 2).

Fig. 2. Skin apposition immediately following surgery (case 2).

The initial operations (cases 1, 2, and 3) were performed at the School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, (Hayes and Jordan). The last operation (case 4) was performed at the School of Veterinary Medicine, University of Georgia, Athens, Georgia (Causey).

Diagram A. Lateral surface of the appendage. Broken gray line indicates lateral incision for medial approach to operation. Solid gray line indicates lateral incision for lateral approach.

data compiled from the experimental and clinical cases. For the acquisition of simplicity in describing surgical procedures, the terms *lateral approach* and *medial approach* will be used.

Terminology

Lateral Approach. A lateral approach to the operation is indicated where necessity or choice calls for utilization of the lateral musculature as a "flap." If there is an alterant in technic, this approach should be considered.

Initial incisura is induced in the proximity of the tuber ischii, extending laterally and anteriorly following a ventro-concentric pattern and is terminated in the flank (diagram A). Lateral fascia and muscle dissection is then realized and the musculature carefully reflected from the femur and retained for covering the exposed acetabulum.

Upon completion of lateral dissection, the leg is elevated and severing of medial tissues begun. On the medial surface of the leg, caudal prolongation of the lateral incision is commenced, passing dorsally to the damaged area, connecting with the posterior apex of lateral dissection (diagram B). Extreme caution and adequate hemostasis should be observed throughout medial dissection.

After a 360 degree encounterment of the acetabulum, a circular penetration of the joint capsule is made and a ligature of the intra-

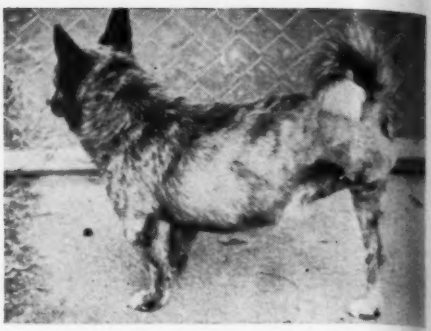

Fig. 3. Sixty days postoperative (case 2).

capsular vascular system imposed. The limb is then removed.

Medial Approach. A medial approach to the operation should be considered where it is necessary to use the medial musculature as a "flap." Should the nature of the operation offer a choice in procedure, it has been pointed out that this method is second preference.

Initial incisura is induced in the proximity of the tuber ischii, extended dorsally and anteriorly, passing between the trochanter major and border of the acetabulum, and is terminated in the flank (diagram A). Further severing of tissues is continued until the joint capsule has been reached.

Upon completion of lateral dissection, the leg is elevated and severing of medial tissues begun. Reciprocative to that delineated, caudal

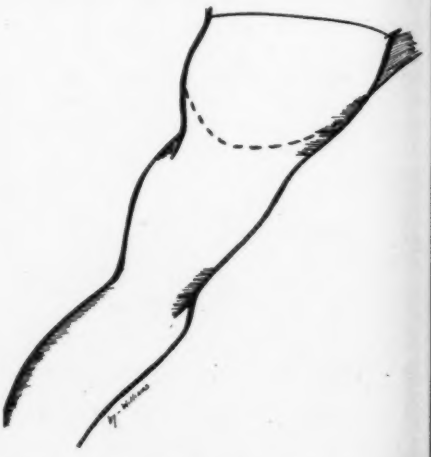

Diagram B. Medial surface of the appendage. Broken gray line indicates medial incision for medial approach to operation. Solid gray line indicates medial incision for lateral approach.

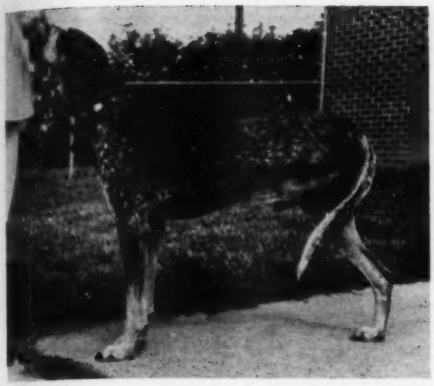

Fig. 4. Twenty-two days postoperative (case 3).

prolongation of the lateral incision is commenced, passing medially in a ventroconcentric fashion and extended to join the posterior apex of lateral dissection (diagram B). Medial fascia and muscle dissection is realized and the musculature carefully reflected from the appendicular skeleton. A maximum of tissues are retained for enclosure of the acetabulum. The necessary hemostasis and concurrent ligation of vessels should be rigidly observed throughout the latter manipulation.

A 360 degree penetration of the capsule is inaugurated, with the subsequent ligation of the intracapsular vascular system. The limb is then removed.

General Considerations

The site and extent of traumatized or diseased tissues are major factors for deciding the exact limitation of tissue retention and debridement. Individual cases will differ; consequently, a number of variants in dissection may be anticipated. For this reason musculature nomenclature has been omitted from these descriptions. A general policy should be that of retaining as much skin and muscle as possible, after which the necessary trimming is easily accomplished. In accordance with previous descriptions, the retained tissues are used for protecting the exposed surfaces of the pelvis.

After the required trimming of both skin and musculature, extensive curettage of the joint capsule should be induced. The retained muscle fascia is then brought into apposition with the opposing tissues, and adequate suturelines induced in such a manner as to eliminate a maximum of so-called "dead space." Gelfoam® has been found to be of considerable

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TABLE 1.

Case No.	Sex	Age. Yr.	Wt. Lb.	Path.	Surg. Proc.	Termination
1	Male	2	21	Normal animal (Exper.)	Medial approach as described	Rapid recovery from initial surgery. Healing complete 30 days after operation. Sixty days postoperative, patient observed to be in excellent condition. Powers of locomotion near normal.
2	Male	8	15	Pronounced tissue necrosis of the medial musculature of the left rear limb.	Lateral approach as described	Slow recovery from initial surgery; rapid improvement thereafter. Healing complete 30 days after operation; patient released from clinic. Sixty days postoperative, patient observed to be in excellent condition. A minimum of encroachment upon powers of locomotion.
3	Male	7	48	Osteogenic sarcoma involving the distal two-thirds of the left femur. Histological diagnosis.	Medial approach as described	Satisfactory recovery from initial surgery. Healing near completion 22 days after operation; patient released from clinic (The expectations for future systemic complications, however, had by no means been expunged[6,7]). Powers of locomotion near normal.
4	Male	12	25	Large cell fibrosarcoma involving the distal half of the left femur. Entire musculature effected. Histological diagnosis.	Lateral approach as described	Rapid recovery from initial surgery. Healing near completion 14 days after operation; patient released from clinic. Powers of locomotion near normal.

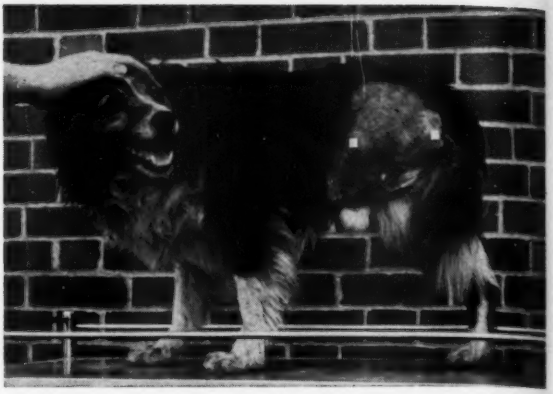

Fig. 6. Fourteen days following surgery. Note landmarks of incision and flap for protection of acetabulum (case 4).

value in affording temporary protection for the acetabulum and at the same time preventing the formation of "pockets" as a potential hindrance in healing.

Results

The following case reports (table I) are submitted with the hopes of stimulating interest for further investigation in this and similar phases of veterinary surgery[8].

Summary

In-so-far as the writers have been able to determine, an account of a coxafemoral dis-

Fig. 5. Roentgenogram of limb prior to surgery. Diagnosis — fibrosarcoma (case 4).

articulation, with the subsequent removal of an appendage, does not appear in the veterinary literature. In this report two approaches to amputation have been described with a concurrent implication of a number of variations in technic. One experimental subject and three clinical cases have been presented for consideration.

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Breeding And Disease Problems Of Mink

AUSTIN E. LARSEN,* D.V.M., Salt Lake City, Utah

DURING the past few years, mink ranching has become big business. Today there are over 5,000 mink ranchers in the United States; 5,000 potential veterinary clients. At present there are about half a dozen veterinarians that are working full time with mink, either in research or with different mink associations. This article is presented in order to acquaint veterinarians and to encourage their consideration of some of the disease problems confronting the mink industry.

Breeding Problems

Mink differ from other farm animals and pets in that they will mate only during the last few days of February and the month of March, and the first four or five days of April. The female apparently ovulates only when mated or severely ridden by the male as in the case of rabbits. Females usually will mate a second or third time during March and since the heat cycle is six to nine days, remating should be made possible only between the seventh or ninth day after the first mating. Mating at any other time may upset the entire cycle and there may be no kits born. It is common practice to mate mink a second time on the seventh, eighth, or ninth day as there has been evidence that larger litters do occur as a result of this procedure. Most kits result from the second mating, but some in the litter may result from the first. There is no definite period of gestation in the mink. It will vary anywhere from 40 to 70 days, depending largely on what part of the month of March the female is bred. The estrual cycle of mink can be changed with artificial light. Six ranches last year that had fed at night could mate only approximately 20% of their breeding females during the regular mating season.

One of the problems confronting the veterinarian is that there are usually between 10 and 20% of females that can not be bred. These fight males ferociously. The mink breeder is continuously looking for something to assure breeding efficiency of these females. The administration of estrogens appear to quiet females, but those so far employed unfortunately do not effect ovulation.

During the past four years of experimenting with this situation (to produce estrum with ovulation) the author has injected more than 500 females with estradiol cyclopentylpropionate (ECP)®, but not one young mink was born, although nearly every female mated. This bears out Venzke[1] work with sheep. An interesting side reaction observed on use of this hormone in dosages of 25 mg. to 30 mg., is that some females lost all fur if given two injections. They were completely bald for about two months.

It may be well to make note that the mink industry is quite concerned about the widespread use of diethylstibestrol in cattle feeding. Most mink feeds contain approximately 15% cattle by-products such as tripe and liver. There is question of how much residue of diethylstibestrol or metabolized products are left in these products when they are fed to mink, and how it may influence normal cyclic changes. In several large herds of mink unfortunate experience followed feeding by-products from poultry processing. In all of these no young were born even though normal mating was experienced earlier.

It appears from experimental results so far concluded, that the amount of residue in cattle by-products will not cause trouble.

Other estrogens such as diethylstibestrol, and estradiol, were used but with no success. There is some evidence that gonadotropic hormones may be of some value in mink that have not been mated by the 25th day of March; females may mate the second day after injection. The dosage is 200 to 500 units, varying with different commercially available products. Mating should be tried again in eight days, and about 50% of these will have young. In records kept of over 400 mink injected with gonadotropic hormones, only 60% could be mated, and approximately 60% mated had young.

Inexperienced mink ranchers may be concerned because the testes in males which are held high, partially in the inguinal canal, may appear not to be descending just before the

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®The Upjohn Co., Kalamazoo, Mich.

mating season. These glands retract again after the mating season. Chorionic gonadotropic hormones have little effect in relieving this condition. Among thousands of males this author has observed, few cryptorchid mink have been observed; they do occur especially in herds in which intensive inbreeding has been practiced.

Sterility in males is also a problem. Some sterile males have bred as high as 20 females in one season. This could be costly. It is a common practice to sperm check each male. This is done by using a long dropper (one inch) for removing sample from the female vagina after the act of copulation. One must be careful that the female is held securely so that the dropper does not break. This can be done by the owner while the veterinarian takes the sample. Such samples are usually mixed with urine and mucus which does not affect its value for sperm motility and viability study on wet mount prepared on the spot.

Sanitary precautions must be taken in collecting semen samples. Most large breeders have their own microscope and test their breeding animals routinely, but many new breeders know nothing about the use of a microscope, and the practicing veterinarian may be called upon for this service.

There are always a few mink that will require Cesarean section. These are usually brought to the veterinarian's office after the female is quite toxic. It is best to place kits with foster mothers which will readily adopt them. Ether works well as an anesthetic agent. Dosage of barbituarates is difficult to control because of variable susceptibility. In an experiment with 40 mink given pentobarbital sodium, dosages varied from 0.5 to 1.5 ml. There were several deaths with 0.5 ml. and some others were not anesthetized after injection of 1.25 ml.

COMMON DISEASE AFFECTING MINK

DISTEMPER

Distemper is dreaded by mink ranchers the country over. The virus may be introduced by the purchase of new breeding stock but usually is transmitted by dogs. Incubation period is usually seven to 14 days. Onset is evidenced by excessive blinking of the eyes. The nose then becomes dry and crusty. Affected animals do not suffer nasal discharge such as seen in dogs. Eyelids become swollen, and soon may stick shut. Later, foot pads may swell to twice their normal size. If all four feet are swollen one can be certain the disease is distemper. As soon as the disease is diagnosed all animals exhibiting symptoms probably should be destroyed, as treatment is impractical. The remainder of the herd should be inoculated with modified live virus vaccine. Canine distemper antiserum is of little value in cases of mink distemper. It will hold the disease down after injection for about two weeks but new cases will occur afterward. Recommended is the use of modified vaccines even though the disease is widespread. These vaccines will usually induce a solid immunity, in herds in which the disease exists, within two weeks, unless it has been present for some time before vaccinating and many animals are in the incubation stage at the time of vaccination. Several animals in affected herds may die after vaccinating with only screaming fits (encephalitis). The author has vaccinated approximately 100,000 animals with a modified live virus vaccine and has only seen one distemper break following vaccination.

Preventive vaccination is recommended to control distemper in mink herds. The procedure most commonly employed is to vaccinate all young breeding stock in December or January. Old mink need not be vaccinated a second time. In areas where the distemper is present it is advisable to vaccinate all animals in July even though most of them will be pelted in the fall. A recent development that will bear watching is aerosol vaccination. Several thousand mink were vaccinated by this method in Canada last year and results appear favorable. It may be possible to use this on all young animals and then vaccinate the breeding stock by the injection method after others are pelted, thus providing stronger immunity against exposure.

Botulism

Botulism is a constant hazard to the mink industry because of the raw meat and fish products that are the main source of nutrients. In many instances, these products are improperly handled. Botulism is a spectacular disease, as hundreds of mink may die within a brief period following the feeding of contaminated food. Animals exhibit progressive paralysis, abdominal breathing, and a short comatose period before death. They may die within three or four hours after apparent symptoms but usually death occurs in approximately 24 hours. In practically all cases reported the toxin affecting mink has been type C. Gorham[4] and Kull[5] both found that mink were quite resistant to types A and B, but in the case of an outbreak it would be wise to use polyvalent antitoxin against *Clostridium botulinum* types A, B and C to all survivors, in dosages of 5 to 8 cc. intraperitoneally. Kull and workers[5]

were the first to work with a toxoid to protect mink against botulism. The writer has conducted research on toxoid for the past two years. During the past year over 8,000 mink were vaccinated. Challenge of immunized and control animals illustrates decisively that immunized animals were completely protected against challenge doses of toxin which killed all control animals within 36 hours.

Septicemia

Streptococcic septicemia is a disease seen largely in young mink. This is probably a foodborne infection. It strikes quickly and sporadically. Usually kit eats the day before death and the first indication of disease may be the discovery of a dead kit. If discovered in time, penicillin should be effective as susceptible strains of streptococci can be isolated usually from such cases in pure culture. Streptococcus is found in most of the abscesses seen in mink which occur frequently in the region of the head. These are usually caused by laceration from small bones or bad bedding. Abscesses should be opened and if ointments used for mastitis are injected into the area combined with 200,000 units of penicillin administered intramuscularly, rapid recovery follows promptly.

Gastroenteritis

Enteritis due to a variety of causes is also common. Meat and fish may contain bacteria that will incite inflammation of the stomach and intestines, or they may contain toxins referred to as ptomaines. Symptoms will vary with intensity of infection. Feces may vary from a liquid to a bloody type. Control measures consist of careful handling of food stuff, feeding utensils, and feed boards. The most effective therapeutic agents are the antibiotics such as terramycin® or aureomycin®. These can be administered by 50 mg. capsules or with soluble solutions.

Various organisms have been implicated as etiological agents for enteritis. Species of Salmonellae have been commonly mentioned. Gorham and Baker[4] however were unable to produce Salmonella infections in either normal or diet deficient animals. Various bacteria have been isolated, such as *Pseudomonas aerugenosa, Escherichia coli, Micrococcus pyogenes* different strains of Salmonella, or a combination of these may cause different types of enteritis. During the past two years, the author has been working with a mixed bacteria employed as a chemotherapy agent in chronic enteritis that has not, responded to antibiotic therapy. This mixed bacterin administered in 1 to 2 cc. doses for three injections at weekly intervals has proved its practical value in my hands by lowering expected mortality.

A virus enteritis that has been confined mainly in Canada, is being observed more frequently in the north-central states. Research is being conducted by various universities and a vaccine should soon be forthcoming that will protect against this disease.

During the past two years several cases of Pseudomonas infection have been referred. Death was rapid and losses reached 10% of the herd. Treatment of all animals with soluble terramycin gave fair results.

Nursing Anemia

Nursing anemia is a common ailment of the nursing female and is characterized by an extreme loss of weight and high mortality rates. It is limited to the latter part of June and the first two weeks of July, and mainly, to mothers with large litters. The specific nutritional factors responsible have not been determined. It has been reported to be associated with sodium chloride imbalance and it is advisable to add 0.5% NaCl to the diet. By careful observation many affected females may be detected early, and by separating some of the kits, the condition can be relieved. It is recommended that kits be encouraged to eat and drink as early as possible to alleviate the drain on dams. This condition has responded fairly well to 50% dextrose solution injected intraperitoneally or subcutaneously in 10 cc. doses. In addition, approximately 60 cc. of milk mixed with the yolk of an egg and a teaspoon of multiple vitamin preparation should be given, 20 cc., three times daily, using an 18 gauge urinary catheter as a stomach tube. Since a female with nursing anemia will not eat or drink this treatment tends to alleviate dehydration and also tends to stimulate appetite.

Heat Exhaustion

Heat exhaustion also may cause a high mortality especially in young mink. If the female whelps when the weather is exceptionally hot and humid, kits may die rapidly. The female does not clean them properly. In distress herself, she may lie in the doorway of the nest box shutting off any air currents until the nest box becomes excessively hot and the kits suffocate. Opening the nest box and removing most of the hay to provide for free circulation will help.

With regard to a number of other ailments, particularly those having a nutritional etiology, such as liver disorder, urinary calculi, and nutritional anemia, more information is needed. Presently employed methods of prevention and treatment of these conditions is unsatisfactory.

There are numerous other ailments and diseases that affect mink that are common to other animals including: Mouth infection, encephalitis, pneumonia, tuberculosis, eclampsia, and others that require professional service. Facilities of a diagnostic laboratory are essential to accurate diagnosis and technics of restraint and handling present special problems that are a challenge.

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ANIMAL PATHOLOGY, by *Russell A. Runnells, M.S., D.V.M.*, Head, Department of Animal Pathology, Michigan State College, East Lansing. 718 pages, illustrated, 5th ed., Iowa State College Press, Ames, Iowa, publishers, 1954.—Price $8.50.

Earlier editions of this textbook appeared in 1938, 1941, 1944, and 1946. It can be seen from evidence of demand made on the author and publishers that a special book dealing exclusively with pathology in animal disease was necessary. Each succeeding edition has been reviewed and revised so that the latest is most comprehensive.

The author states in the preface that students of veterinary science of 20 years ago and earlier learned the basic facts of disease from textbooks on human pathology. (Several volumes are in the library of the reviewer). Application of fundamental principles of the science to livestock diseases was made in lectures and demonstrations, or was left for the student's application in later courses. The advent of a suitable text of veterinary pathology has proved advantageous because of direct application of the science to abnormalties as they have been observed to occur in animals.

Material is divided into four parts. Part I, General Pathology, is a study of cause of disorders and effect of the cause in the body. Part II, Special Pathology of the Systems, is as suggested concerned with processes other than normal occurring in special body systems. Part III, Special Pathology of the Specific Infectious Diseases, treats those pathological processes resulting from invasion of organisms (pathogens). In this case, broader aspects of pathology are discussed as processes are interrelated between body systems. Part IV, Special Pathology of Food Deficiency Diseases, perhaps deserves special recommendation for study, especially by those already established in practice.

Insecticide Poisoning*

Poultry are highly susceptible to insecticide poisoning. Young calves, lactating females, and debilitated animals are more susceptible than other groups of livestock.

Chlorinated Hydrocarbon Insecticides

Symptoms of poisoning with this group of insecticides are variable. Excitement is common, and is usually seen within 24 hours after exposure. Muscular spasms start at the head and are associated with champing of the jaws and salivation. These may progress to involvement of the rest of the musculature manifesting itself in aimless walking and running. Explosive symptoms and convulsions are not uncommon. Depression and drowsiness sometimes are exhibited by intoxicated animals. The temperature readings may go as high as 116-118°F. following convulsive seizures.

Examples of this group of insecticides: Chlordane, BHC, toxaphene, heptachlor, aldrin, strobane, DDT, methoxychlor.

Organic Phosphorus Insecticides

Symptoms of poisoning with this group are fairly characteristic: Salivation, dyspnea, stiff-legged walk.

Poisoning with these insecticides can be treated effectively with atropine. The dose is 0.5 mg. per kg. of body weight, one-half of it given intravenously, the rest intramuscularly.

Examples of this group of insecticides: Parathion, EPN, malathion, diazinon, chlorthion.

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*Notes from address by Dr. R. D. Radeleff, Kerrville, Texas presented at the California Veterinary Association, Mid-Winter meeting, January 24, 1956.

The Use Of Oral And Parenteral Tetracycline In Canine Practice

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CLINICAL use of therapeutic agents, following indications of efficacy observed in laboratory studies, reveals the true scope of applicability of such agents. The purpose of this report is to show the variety of infections in dogs in which tetracycline* has been administered both orally and parenterally, and to indicate which of these, under the conditions of this practice, have apparently been cured or ameliorated. Encouraging results suggest more widespread use to further determine the value of tetracycline therapy in canine practice.

Oral

Twenty-three canine patients have been treated orally. Capsules containing 100 mg. or 250 mg. tetracycline hydrochloride (crystalline) were used. Dosages varied from 5 to 25 mg. per lb. body weight daily, with the majority receiving between 10 to 15 mg. per lb., administered once daily. Three dogs were treated at dosages of 5 to 10 mg. per lb. Dosages of 18 to 25 mg. per lb. were used in the more chronic conditions. There appeared to be no differences in response to the various dosages, probably because of the differences in severity of infection, and susceptibility of the organisms responsible for the condition to the activity of the antibiotic.

Clinical improvement was usually evident in one or two days. Thirteen dogs recovered within the first week, 11 of these within five days. Only three dogs treated required more than one week for full recovery, and all these recovered before two weeks had passed.

Genitourinary Infections. Of five dogs suffering cystitis, four recovered following treatment, and one showed improvement. This latter case was of eight months duration. One small calculus has been passed, and hematuria is evident periodically. The owner has refused surgery, and prefers to control the condition with chlorethamine tablets. No bacteria have been demonstrated on Gram stain or urinary sediment since tetracycline therapy was instituted.

One of two dogs with pyelonephritis recovered following oral treatment. No response was noted in the second. This was a chronic case which had exhibited symptoms four months before the first examination. Cystitis was suspected. However, when only slight improvement was produced by repeated treatment, a pyelogram confirmed the suspicion that the infection was higher in the urinary tract. Tetracycline failed to control the pyelonephritis that was discovered, and the dog died about two weeks later.

Gastrointestinal Infections. Tetracycline was used in treatment of two dogs with enteritis, two with colitis, and one with coccidiosis. Four recovered uneventfully. One with enteritis improved, as bowel movements, watery in character when treatment was first instituted, became soft and partially formed. Ten days later, this dog began to lose weight, and incoordination of the hind quarters was evident a few days later. It is entirely possible that correct diagnosis should have been enteritis secondary to distemper complex.

Only one dog with coccidiosis was treated in this series. This animal was treated for four days with early change in the character of the feces. Coccidia could not be demonstrated six days after cessation of treatment. As coccidiosis is a self-limiting infection, the exact effect of the antibiotic on the coccidia can not be assessed.

Distemper Complex. A symptomatic diagnosis of some form of the distemper complex was made in seven dogs. Tetracycline was administered together with the usual supportive and specific medicaments. Four dogs recovered uneventfully; in two of these, pneumonia was the principal complication. No effect was noted in three; two of these were treated in the late stages. The effectiveness of tetracycline, given orally in treatment of secondary bacterial infections following distemper, was comparable with other antibiotics. It was effective in the treatment of pneumonia.

Miscellaneous. One dog, classified under central nervous system disturbance, had suffered an acute otitis media, according to the owner, about five months previously. When presented, it constantly carried the head titled

*Polyotic brand of tetracycline, is the trade mark of the Lederle Laboratories Division, Pearl River, N. Y.

to one side. No other symptoms were noted, and treatment with oral tetracycline was undertaken to attack a lingering bacterial infection should this have been present. Treatment, however, was ineffective.

An abscess was forming in the ventral neck region in one dog. Preventive treatment was apparently effective.

Urethral calculi, causing a blockage of the urethra, were removed surgically from a male Cocker Spaniel. On the third postoperative day, a rise in temperature was noted. Tetracycline was given orally for four days, when the temperature was again normal. During the febrile reaction, there was no visible sign of infection.

Listlessness, anorexia, slight scleritis, and a temperature of 105F. were the only symptoms noted in one dog presented for treatment. A white blood count revealed a leukocytosis of 26,000. A diagnosis of bacterial infection was made until further developments could be observed. On the third day of treatment, there was no evidence of illness, the patient was discharged, and there was no recurrence.

Parenteral

Tetracycline was administered intramuscularly or intravenously to 15 dogs. In all cases, immediate activity was desired or vomition made the retention of oral medication impossible. Dogs treated were usually in poor physical condition, the pathological condition present was serious and extreme, and the prognosis was always grave and guarded.

Tetracycline hydrochloride (crystalline) was supplied in 50 mg. and 100 mg. rubber capped vials and was reconstituted for use with sterile distilled water to make a final concentration of 25 or 50 mg. per cc. Total daily intravenous dosage varied from 2 to 4 mg. per lb. of body weight and intramuscular dosage from 3 to 8 mg. per lb., usually administered in equally divided doses twice daily. A few dogs received both intravenous and intramuscular tetracycline simultaneously, for a total dosage of 12 mg. per lb. for the heaviest dog treated. In certain cases where infections are deep seated, higher dosage than would normally be used seems to be indicated. It did appear, in those treated in this series, that many lived longer than had been expected when so treated. In some patients, initial parenteral administration was followed by oral dosages. In general, if no effect was noted in 3 or 4 days, other treatment was instituted.

Seven dogs fully recovered, and one improved. Postmortem examination of two of the seven that died revealed conditions not expected to respond to antibiotic therapy—diabetes, and cystic kidneys caused by an irritant.

Leptospirosis. A diagnosis of leptospirosis was made in four acutely and violently sick dogs on the basis of symptoms, leukocyte count, and blood urea nitrogen determination. Two were treated intramuscularly with recovery of one and death of the second; one treated intravenously died on the second day of treatment; and one treated by both parenteral routes recovered on the fourth day of treatment. Usual supportive therapy was administered concurrently, including perfusions or infusions, 20% sodium dehydrocholate intravenously, B complex, and in one case, a blood transfusion.

Nonspecific Infection. Five dogs were classified under "toxic syndrome" as specific diagnosis at time of examination could not be made. One received tetracycline intramuscularly, and the other four were given tetracycline intravenously. Three of these five died. One dog was prostrate and extremely febrile, running a temperature of 103 to 105F. Polydipsia, polyuria, vomition, and anorexia were noted. The leukocyte count was 25,200 and a urine examination led to a diagnosis of acute nephritis, although a possibility of diabetes mellitus existed as urine sugar was 3. In addition to tetracycline therapy, 40 units of protamine zinc insulin was given due to the increased urine sugar. The dog died on the second day, and the diagnosis of diabetes was confirmed by histopathological examination.

A diagnosis of nephritis was made in a second dog. According to the owner, the condition had been present only three or four days, but the appearance of the dog suggested a duration of three or four weeks. The dog died on the second day of treatment, and autopsy revealed cystic kidneys. Further questioning of the owner brought out the fact that the dog had been eating borax from a sack stored in the garage.

All five animals in this group received supportive therapy. The two that recovered were maintained on parenteral infusions for two and four days respectively, and one received a blood transfusion.

Miscellaneous. Two dogs with nephritis, and one with pneumonia were traeted, with recovery in all three. Experience with both oral and parenteral forms of tetracycline appears to indicate that the antibiotic is extremely efficient for urinary tract infections and pneumonia.

One dog demonstrated only central nervous

system symptoms, at first moving only to the left side, with the next development best described by the term "dummy." Sneezing was the only other symptom noted. The administration of an antibiotic combination product had had no effect. An initial intravenous dose of tetracycline, followed by intramuscular dosage for three days, resulted in no appreciable change. Infusions were given concurrently with both antibiotic treatments.

A one-year-old Dachshund was presented one evening because of vomition and diarrhea that had occurred the morning of the same day. The dog appeared normal, and the attack was attributed to gastroenteritis. There was recurrence in four days. On the fifth day, examination revealed injected sclera and a WBC of 11,200. Temperature had remained normal throughout. Treatment for gastroenteritis was instituted with some improvement noted by evening. The next afternoon, the dog was presented in coma and extremely jaundiced. Despite infusions, B complex, 20% sodium dehydrocholate intravenously, blood transfusion, and tetracycline intravenously, the dog died that evening. A diagnosis of acute infectious hepatitis was made after histopathological examination.

A febrile reaction occurred in one dog following fracture reduction by open intramedullary pinning of the bone. Tetracycline was administered intramuscularly. By the fourth day, the temperature had returned to normal and the fracture healed uneventfully.

Reactions

There were no observable reactions to tetracycline administered orally or intravenously. An interesting observation has been made, however, concerning intramuscular administration. In general, an intramuscular injection will be administered routinely into the thigh muscle. The recommendation for injection of intramuscular tetracycline in the dog and cat is deep into the gluteal muscle. It has been observed repeatedly that injection of tetracycline into the thigh muscle in the dog, especially in high dosage, results in immediate pain which is intense and lasting, as pain at the site of injection and lameness was evident for several days, in one case nearly a week following the last injection. It is believed that the antibiotic was deposited between the fascial coverings of the thigh muscles resulting in poor absorption. On the other hand, administration into the gluteal muscle has resulted in less than 5% reactions in hundreds of dogs treated experimentally.

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Gastrotomy on a Boxer Pup

STANLEY C. WASMAN, D.V.M.,
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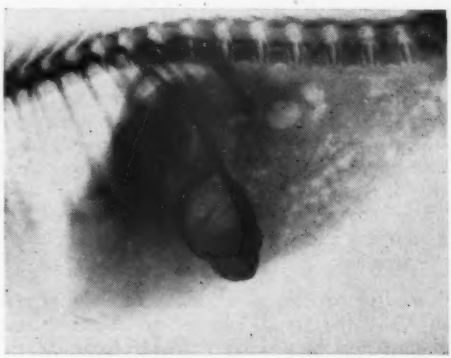
A routine gastrotomy on a boxer pup is reported here. The rather humorous appearance of the accompanying *x*-ray provides a basis for the report.



About 9 p.m. on December 23, the owner of a ten-week-old male Boxer pup called and excitedly reported that she believed the puppy had swallowed a large rubber mouse. My first reaction was to assure the owner that this was probably impossible and to observe the puppy closely and report any further findings. One hour later the owner called to report that the puppy was vomiting violently and in distress. The patient was seen at the hospital that evening and seemed normal except for a little sensitivity in the upper abdomen. Radiograph was taken of the abdominal area and portrayed one of the most unusual pictures that we have seen in this hospital in *x*-ray work. A complete outline of the mouse including the tail and whiskers was obvious.

The next morning the puppy was prepared for a routine gastrotomy and a large, soft rubber mouse was removed from the dog's stomach. Recovery was uneventful. The patient is enjoying normal health.

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Dried yeast is the name legally reserved for labeling purposes for the dried cells of *S. cerevisiae*, the common yeast of brewers and bakers. This yeast does not differ appreciably, in chemical analysis, from some other members of the yeast family. Profound differences, however, in their effects on the body can be demonstrated by suitably designed feeding tests.

The Practical Results of Sensitivity Tests in Small Animal Practice

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To illustrate the varied use to which the sensitivity test may be put in small animal practice, 200 tests were chosen from our files at random to make up this report. These tests represent material submitted during the year 1955.

Fifty ear discharge specimens and 50 urine specimens were used as these are most frequently submitted. Fecal material, eye, nose and mouth swabs, and skin scrapings were the next most numerous in that order, and 55 miscellaneous reports were chosen as exemplifying unusual material from various areas of infection.

Rod or bacillus infections were encountered in 36 of the 50 samples of ear material and staphylococcus was also grown from 28 of these. The cultures were all grown in tryptose phosphate broth and incubated at 37 C. for at least 12 hours. Only five of the cultures were either only Gram-positive or Gram-negative which establishes the point that, as is well known, mixed infections predominate in conditions of this area.

In the form of impregnated discs, all of the antibiotics may be used singly and in combinations currently available when the cultures are plated out on trypticase soy agar and allowed to incubate another 12 hours before the results are read. The diameter of the completely clear inhibition zone of each test disc serves as the yardstick of its efficiency.

The most efficient drug and the number of times each was indicated as the first choice in these 50 tests are as follows:

Chloromycetin®	15	or	30%
Erythromycin	13	or	26%
Penicillin	1	or	2%
Neomycin	5	or	10%
Terramycin®	6	or	12%
Streptomycin	7	or	14%
Bacitracin	1	or	2%
Carbomycin	1	or	2%
Aureomycin®	1	or	2%

The 50 urine cultures chosen showed that 26 of them were pure which may be surprising as there is a common opinion that much contaminated debris is usual in this material. Careful sampling by the veterinarian is a valuable aid to the laboratory in these cases.

Twelve of the cultures were mixed forms of bacilli, while 12 others contained cocci and bacilli in various forms.

The antibiotics of choice and the frequency of their effectiveness was as follows:

Erythromycin	14	or	28%
Neomycin	7	or	14%
Chloromycetin	10	or	20%
Achromycin	3	or	6%
Streptomycin	9	or	18%
Aureomycin	3	or	6%
Triple Sulfonamides	1	or	2%
Terramycin	3	or	6%

Cultures of fecal material, of course, produce a variety of bacteria both Gram-positive and Gram-negative. Chloromycetin proved to be the most effective drug to inhibit the bacterial growth of the majority of these 50 cultures, followed by neomycin. Streptomycin was indicated once as was erythromycin.

Thirty swabs of eye, nose and mouth material contained five bacilli infections and eight cocci infections while the remaining majority were again mixed forms of bacteria. The antibiotics most effective in combatting these conditions were as follows:

Chloromycetin	11
Terramycin	2
Erythromycin	12
Penicillin	2
Streptomycin	2
Aureomycin	1

Skin scrapings submitted for possible ringworm culture often prove to be bacterial infections instead of fungi. Staphylococcus occurred in 13 of 20 of these; a pure culture growing in five and a mixed culture in the others. The remaining seven cultures contained mixed forms of bacilli.

Chloromycetin was the antibiotic of choice in nine of these tests, erythromycin in 7, terramycin in three and streptomycin in one instance.

Material examined in the 55 remaining tests included blood, vaginal discharges, anal discharges, cystic fluid, fistular material, lung exudates, bone infections caused by a medullary pin, abdominal cavity fluid, pustules on the skin, milk secretions, and body wounds.

Chloromycetin was again the predominant choice, being indicated in 24 tests. Erythromycin was the choice in 12 instances, penicillin in four, terramycin in three, streptomycin in two, neomycin in seven, archromycin in two and penicillin and streptomycin combined in 1.

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Thus, in spite of the many antibiotics produced today, the results of these 200 tests indicate that an overwhelming majority of infections in small animals are best inhibited by one of six or seven of the possible 19 chemotherapeutic agents used singly or in combinations.

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DOMESTIC RABBIT PRODUCTION, by *George S. Templeton,* Director of the U.S. Rabbit Experiment Station, Fontana, California. 210 pages, 78 illustrations, cloth bound. The Interstate Printers and Publishers, Danville, Ill., Publishers.—Price $3.50.

The food crisis, child of war-time economy, may be said to have brought to the attention of many the merits of domestic meat rabbit production. In some European countries, notably France, rabbit meat is an important source of meat food products.

It was during the two recent wars that the American public became acquainted with domestic rabbit meat, quickly recognized its quality and accepted it. It is estimated that over 50,000,000 lb. of rabbit meat are being produced in the United States annually.

Domestic Rabbit Production is a guide book for producers. It covers the rabbit industry from breeding to preparation for the table. It is a handbook that one can pick up to find the answer to any common problem. Chapter X is devoted to a discussion of most common diseases. Symptoms, diagnosis, and suggested treatment methods are given.

The book is not a veterinary textbook but should prove useful for practitioners who are called upon to advise reference maintenance of health in rabbit herds.

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Prevention of Heartworms

Over 20 dogs are now on a regular schedule of therapy to determine if administration of caricide® might be regulated to serve as a preventive agent for canine heartworms in our area where rate of infection is high. Regimen now applied is a daily oral dose for three days at intervals of six months. Animals are started at ages varying from two to six months. All those started were negative on examination after the second series excepting one who was considered heavily infected at the beginning of the test. The third dose has been given and testing and treatment will be repeated again early in 1956.

The procedure gives some promise of being suitable for those sections where incidence of filariasis is high. *A. Soltys, B.V.Sc., V.S., Nassu, Bahamas.*

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Nitrite Poisoning

A report of chemical poisoning due to excessive nitrites added to sausages has been received from Louisiana. Ten cases of methemoglobinemia among children, associated with ingestion of cured meat to which nitrites were added was reported. Public health veterinarians and inspectors attach considerable importance to these reports and recognize the necessity for strict supervision of processing methods to avoid exceeding maximum allowance provided by law.

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Organic chemical compound prepared and documented now total some 750,000, of which only 7,000 are in use.—*Charles N. Kimball, D.Sc.*

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A Symposium on Canine Clinical Diagnosis, held February 5 at Worcester, Mass., under auspices of the Worcester County Veterinary Medical Association, attracted an attendance of 250 New England veterinarians and their wives. Among the speakers were: (l. to r.) Lt. Col. T. C. Jones of Washington, Chief Veterinarian, Pathology Section, Armed Forces Institute of Pathology (left); Dr. Calvin C. Turbes, University of Indiana; Dr. W. C. Banks, Texas A.&M. College; and Dr. Frank Bloom, consultant, Flushing, N. Y. Not shown in picture were Dr. Frank Kral, University of Pennsylvania; Dr. Hudson Hoagland, Worcester Foundation for Experimental Biology; and Dr. Marcus Mason, president of the Association.

Army Medical Service 1955 Summer ROTC Camp

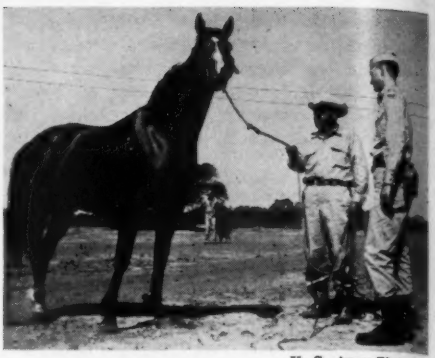
The age-old call of the Army bugler became familiar music to 79 veterinary ROTC cadets who attended the 1955 Army Medical Service ROTC Summer Camp at Brooke Army Medical Center, Ft. Sam Houston, Texas. Wide open spaces of Texas also became familiar to them as the cadets moved to the field for training in some of the rigors of Army life they may meet when they come on active duty as officers in the Veterinary Corps.

The cadets, from five veterinary colleges, spent six weeks at the camp, where they learned the professional side of Army veterinary life, plus the strictly military side of it. They came from Colorado A. & M. College, Iowa State College, Kansas State College, Ohio State University and the University of Pennsylvania.

Highlight of the six weeks training was an annually-scheduled trip to the King Ranch in South Texas. In the day-long visit to the world-famed ranch they saw Santa Gertrudis cattle—product of a long breeding program, Quarter horses, Thoroughbreds and large-scale programs of range improvement. Dr. J. K. Northway, veterinarian at the ranch since 1916, described the struggles against insects, harsh climate, and rough terrain.

A second day-long field trip saw the cadets at the United States Department of Agriculture experiment station at Kerrville, Texas. Research previewed there included testing of insecticides used against most of the major animal-attacking insects in this country. Latest research is work on systemic insecticides—to find a chemical that can be fed or injected to control biting insects and parasites without hazard to the animal or consumer of its carcass.

Other trips included those to a San Antonio dairy plant, to Quartermaster facilities at Fort Sam Houston and to Randolph Air Base, where the cadets surveyed Air Force veterinary installations and research. Thirty per cent of the cadet class will go to the Air Force for active duty.



U. S. Army Photograph

David R. Bright, veterinary cadet from Ohio State University and a resident of Vanlue, Ohio, admires one of the famous Thoroughbred stallions at the King Ranch in South Texas. Bright was touring the ranch with veterinary cadets attending summer camp at Brooke Army Medical Center. He's Derby-winner Middleground, held here by trainer Libado Maldonado of the King Ranch staff.

Much of the work of Army veterinarians now is food inspection. Control of Communicable diseases transmissible to man on Army posts demand a share of the time, and in addition there are complicated animal research programs. But a few reminders of the "Old Army" are still around and the veterinary cadets were exposed to these at the summer camp.

Six Army mules from the 35th Quartermaster Pack Company were shipped from Fort Carson, Colo., for the six week camp. This, the only mule unit now in the Army, has

This Army dog named Mitch has been trained to conquer any of the rough obstacles facing him under combat conditions. Two veterinary cadets from Colorado A.&M. College watch Sgt. Jesse Mendez direct the dog through an obstacle course. The cadets are (left) Marvin O. Maul, Kiowa; and John R. Ipson, Denver, Colorado.

U. S. Army Photograph

proved most valuable in mountain training carried on at Carson, including mountain rescue work. There is a distinct possibility that a future war, in spite of modern mechanization, might require one of the earliest forms of military transportation . . . the venerable mule.

Cadets were taught how to pack the mules for carrying either provisions or combat casualties, and learned how the Army keeps these animals healthy. They also led the mules on a short march down MacArthur field through the center of Fort Sam Houston.

Two Army sentry dogs were also brought from Fort Carson to instruct cadets in the care of these animals, which are trained to attack any unfamiliar person.

Cadets became throughly familiar with the "GI" side of Army life, both garrison and combat. At Friday night GI parties they got workouts with mops and brooms. Saturday mornings found them standing inspection in the barracks and on the drill field. Climax of the inspections came when Major General Samuel T. Williams, Fourth Army Commander, took the salute on the reviewing stand.

Camp Bullis, 20 miles north, provided ample Texas brush country for training in some of the more rugged aspects of Army life.

With map and compass the cadets were started through the brush on day and night mapping problems.

Later in the training, they shouldered full field packs for the traditional bivouac—which was accompanied by the inevitable Texas thundershower. A particularly hot day found them on the rifle range where they practice-fired the U. S. Army 30 cal. carbine and the 45 cal. pistol.

The cadets were familiarized with the Army's programs for maintaining the health of its soldiers. This included review of the extensive programs in preventive medicine including control of insect, arthropod and rodent-borne diseases. These were, in the early stages of our history, the great scourges of our Army. Now the danger of them is greatly reduced by thorough programs of sanitation and disease control.

The veterinary cadets also saw Army technics in treatment of combat casualties from the time a soldier falls on the battlefield until he is returned to duty or evacuated to rear area hospitals.

Civilian veterinary visitors to the ROTC camp included Dr. Mark W. Allam, dean, College of Veterinary Medicine, University of Pennsylvania; Dr. Willis W. Armistead, dean, and Dr. R. D. Turk, Chairman of Parasitology, School of Veterinary Medicine, Texas A. & M. College.

U. S. Army Photograph

Three nationally-known veterinary scientists visited the AMEDS Summer Camp to review training. Conferring on the schedule from the University of Pennsylvania are (left) Dr. Mark W. Allam, Dean, College of Veterinary Medicine, University of Pennsylvania; Dr. Willis W. Armistead, Dean, and Dr. R. D. Turk, Chairman of Parasitology, School of Veterinary Medicine, Texas A.&M. College.

Major General William E. Shambora, Commanding General of Brooke Army Medical Center, was camp commander. He was assisted by Colonel James E. Snyder, M.C., deputy camp commander, and Major William Brooks, V.C., assistant deputy camp commander.

Veterinary officers from university military staffs who served on the summer camp faculty included Lt. Col. Bernard H. Skold, Colorado A. & M. College; Lt. Col. Edwin J. Sunderville, Cornell University; Lt. Col. Gordon W. Vacura, Kansas State College; Major Robert M. Nims, University of Pennsylvania; Major Samuel W. Thompson, Iowa State College; and Captain John D. Mosley, USAF, Ohio State University.

Brigadier General Elmer W. Young, Chief, Army Veterinary Corps, Washington, addressed opening ceremonies of the camp and told the cadets: "ROTC Summer Camp is designed to teach you as future Army officers to function as a team and to prepare you for a potential attack. American must stand as a united nation and be prepared to face any possible aggressor".

At the graduation ceremony for the camp

Col. Bernard Aabel, chief of the Army Medical Service Corps told them: "At no time in our history has there been greater need for superior military leadership . . . especially that leadership provided by professional officers with varied skills as evidenced in this summer camp."

The cadets will be commissioned as first lieutenants in the U. S. Army Reserve when they complete their veterinary courses and will then serve two years on active duty, with the privilege of electing to remain in service if they desire.

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Increased Incidence of Rabies in Louisiana

The Louisiana State Department of Health has reported 95 laboratory confirmed cases of rabies in animals for the first two months of 1956 compared with 147 for the entire year 1955. Of the total this year, 59 cases were in foxes, 27 in dogs, four in cows, and one each in a goat, horse, and rat. A serious outbreak occurred in the north central part of the state and appears to be moving into Texas in a southwesterly direction.

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Dr. K. F. Meyer of The Hooper Foundation, San Francisco, California, stated that his investigations reveal that 80% of parakeets associated with human cases of psittacosis were under eight months of age and exhibited signs of diarrhea. He also stated that mass distribution of these young birds is the greatest single source of human infection.

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"Life with Rover"

An informal and amusing, yet factual booklet on dog care, Life with Rover, has been prepared by Fromm Laboratories, Inc., of Grafton, Wisconsin. Copies are available to practitioners in quantity on request of the publishers.

Suggestions of a general nature regarding the management of a pet are given. The booklet is illustrated with attractive drawings and space is provided for a medical record.

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A total of 1,506 cases of rabies in animals has been reported for the first quarter of 1956 in 30 states; the disease is so far this year unreported in 18 states.

Suspect Human Psittacosis from Infected Turkeys

Dr. M. S. Holmes, Oregon State Board of Health, has provided preliminary information on an outbreak in which 64 suspect human cases of psittacosis and two deaths were associated with infected turkeys. An unusually high mortality was noted early in February in two turkey flocks on farms located in the northwestern part of the state. A worker on one farm was reported suffering illness resembling psittacosis. On March 8, an employee of a rendering plant, which picked up dead turkeys from affected flocks, was reported as a suspect case. Upon investigation 64 suspect human cases have been discovered so far among employees of the two farms, among persons who dressed dead turkeys and employees of a rendering plant.

The situation is said to be complicated by the fact that human respiratory disease is currently prevalent in the state.

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Transparent Tape for Wound Closure

Surgeon in South Africa reports *(Lancet,* Nov. 5, 1955) satisfactory healing of wound margins which were approximated by transparent tape, popularly known as "scotch tape." Strips of ¼ in. width were applied transversely to the axis of the wound with adequate overlap to fix. Hairline closure could be achieved with practice. Strength was added and air excluded by border strips of tape covering the first applied and running parallel to the incision. No sterilization was practiced since tape contains phenol and latex and is regarded as self-sterilizing.

Healing was prompt and scarring minimized on a group of cases.

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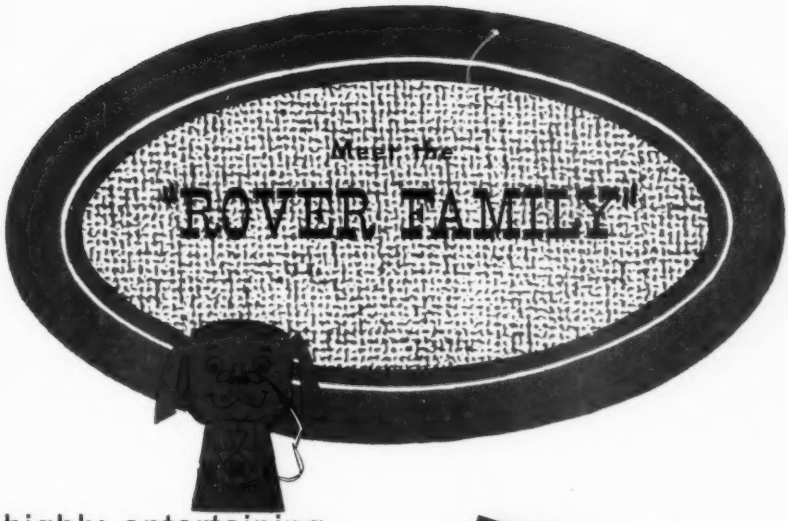
Human Rabies Prophylactic Treatment

The question is asked frequently about the number of persons receiving rabies prophylaxis annually. Pasteur treatment or other prophylactic measures are not reportable so that figures on the number administered is not available. It is suspected, however, that the aggregate number for the United States is large. In February, 69 such treatments were recorded in Illinois.



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(Continued from page 268)

months later it had receded to 1:12.5. Twenty-seven of the vaccinated and 15 control pigs were challenged at 24 months. *Br. suis* was isolated from 96% of the vaccinated and 100% of the controls. They further reported that vaccination of four-to-six-month-old gilts with vaccine prepared from a strain of *Br. suis* reduced in virulence produced immunity for nine months, but was ineffective after 24 months.

D. C. Lindley and J. Rollin Lander[79] attempted to immunize swine with vaccine made from strain 19. Their report showed that gilts vaccinated with 5 cc. subcutaneously were not satisfactorily protected against field exposure to *Br. suis*. Gilts vaccinated with repeated doses of vaccine by the intradermal route farrowed satisfactory litters and did not exhibit breeding difficulty. However, positive evidence of immunity was not obtained.

N. B. McCullough *et al.*[80] reported the isolation of *Br. abortus* from swine. Up to this time, it was thought that pigs were resistant or immune to this strain. They were the first[82] to report isolation of *Br. abortus* from naturally infected hogs.

Kernkamp[81] called attention to the fact that many swine breeders associated abortions with brucellosis but failed to acknowledge its presence where this symptom did not develop.

Research workers of the BAI[88] found that suckling pigs, when naturally exposed to secretions and excretions of infected dams, showed evidence of infection at time of weaning. The earliest age at which infection was found was six weeks. *Br. suis* infection was transmitted from infected pigs to susceptible weanling female pigs after contact exposure of three months. No evidence of infection was demonstrated in the male pigs.

Charles D. Cox and Leon J. Kutner[84] reported on a Brucella agglutinin-blocking phenomenon in cattle sera. They used known *Br. abortus* rabbit antibody and added 0.1 ml. of this serum to each of the agglutination test tubes. They concluded from this work that some sera contained agglutinin blocking properties. The rapid-macroscopic test was not affected by the blocking substance. It would be of value to learn if the Brucella blocking antibodies in bovine sera were "early" or "late" in forming and whether or not it occurs in swine sera.

Washko *et al.*[85] reported that, of 38 swine exposed to *Br. abortus*, 26 did not become infected. *Br. abortus* was isolated from seven, and *Br. suis* from five. Twenty-eight of the 38 developed a complete blood serum agglutination titer of 1:25 or higher. Brucella was isolated from ten.

Treatment of Brucellosis

Streptomycin and sulfadiazine have been used in human medicine for the treatment of undulant fever. Hutchings *et al.*[86] found that treatment seemed to have a definite effect in diminution of numbers of isolations made at autopsy. However, *Br. suis* was isolated from ten of the 15 treated animals. Bacteremia was cleared, but many foci of infection remained. The treated animals did not do well when compared with controls. Weight loss was noticeable, indicating that animals were given maximum dosage.

Norman D. Levine and Robert Graham[87] found that during the ten years between 1938 and 1948, 10.8% of 47,502 swine blood samples from 994 Illinois swine herds were positive to the agglutination test for brucellosis. Positive swine were found in 41.6% of 994 herds. Incidence increased with the size of the herd.

L. M. Hutchings[88] was convinced that test and immediate slaughter of reactors or vaccination was a satisfactory method of control. He suggested two possible methods; first, the sale of the entire herd for slaughter, and second, maintain complete segregation of the infected parent swine from the weaned and tested offspring.

The state of Iowa adopted (1950) the Iowa Accredited Swine Brucellosis Controlled Herd Program[89]. It was voluntary. Three plans were outlined which the farmer could follow.

In an attempt to find the effect of *Br. suis* on cattle, F. V. Washko and L. M. Hutchings[90] found that when *Br. suis* infection localized in the udder, it was responsible for acute mastitis. Active *Br. suis* infection in pregnant cattle did not produce the act of abortion. Postmortem examination of cattle for *Br. suis* resulted in the recovery of the organism from the lymph nodes in widely scattered parts of the body. Brucella were recovered from hams[91] that had been cured for as long as 14 to 21 days, but, from hams that had been in pickle for 20 days and then smoked, no organisms were demonstrated.

A higher percentage of pigs acquired brucellosis by suckling sows with acute brucellosis than by suckling sows with chronic brucellosis, according to information furnished by BAI (1952)[92]. Highest incidence of bacteremia occurred at weaning time or one month thereafter in pigs exposed to dams with subacute

and chronic brucellosis. In pigs exposed to dams with acute infection, it occurred when they were six to eight weeks of age. Further studies demonstrated latent infection in pigs that nursed infected sows.

E. R. Goade *et al.*[98] reported that there was no significant difference in the susceptibility of boars and gilts that suckled dams with acute *Br. suis* infection. Highest incidence of bacteremia in infected suckling pigs occurred when pigs were 42 days of age. One isolation was made at 28 days, and another at 105 days of age. Brucellosis was transmitted from infected to uninfected weanling pigs of the same age and sex by natural exposure.

Alvin B. Hoerlein and T. S. Leith[94] reported that a program of test and removal of animals reacting to the agglutination test was successful in controlling brucellosis. It could not be recommended as efficient because of the time and cost involved. They recommended the removal and isolation of reacting sows to another farm for farrowing.

Hutchings[95] called attention to the fact that swine brucellosis was a menace to human health as well as to the health of animals. *Br. suis* organisms may be isolated from infected swine carcasses for as long as 20 days after slaughter. Man may be able to acquire infection by contact with the live animal and from the carcass. Should *Br. suis* gain access to the udder of dairy cows and then enter a raw milk supply, an epidemic of brucellosis in man may be expected.

C. A. Manthie[96] stated that the three Brucella species usually produce a more self-limiting disease in a foreign host than in the natural host. The fact that many species of domesticated animals are susceptible in varying degrees to all three species of Brucella adds to difficulty of control measures.

Earl D. Hubbard and Alvin B. Hoerlein[97] reported a program of test and slaughter for brucellosis eradication which started in 1947 and which led to the adoption of the official Iowa Certified Brucellosis Controlled Swine Herd Program in the fall of 1949. Their work indicated that brucellosis could be eradicated from Iowa swine herds.

The 1953 Report of the Chief, BAI[98] pointed out that, in naturally occurring swine brucellosis, organisms may localize in the spleen, forming multiple abscesses which are often confused with lesions of tuberculosis. They should be differentiated by laboratory examination.

Alvin B. Hoerlein[99] reported that the agglutination test is usually of no value in young pigs since the tests are usually negative, regardless of the status of brucellosis. Baby pigs, born to infected sows, usually will not become infected if weaned and isolated by complete segregation from the infected herd by 56 days of age.

Doris E. Bunnell *et al.*[100] reported that the administration of aureomycin® did not alter the agglutinin production by *Br. suis* infected swine as compared with the antibody response of controls. *Br. suis* was isolated at autopsy from at least one tissue from 60% of the 25 aureomycin treated infected swine and from at least one tissue of 85% of 20 controls. This might indicate a substantial reduction in the incidence of the disease in treated animals.

Hoerlein also reported[101] that there are a number of low-titer agglutination reactions to be found in some herds free of brucellosis. Some of these may be non-specific. His work showed that, by using an incubation period of 16 hours at 56 C. instead of the usual incubation period of 48 hours at 37.5 C., the positive low titers would be reduced greatly.

In 1954, the Committee on Swine Brucellosis[102] recommended that all states adopt requirements for exhibition and the interstate movement of breeding swine as a step in the control of swine brucellosis.

Hoerlein *et al.*[103] continued their previous work in determining the difference between specific and non-specific agglutination reactions and concluded that additional work was necessary but that it looked promising and accurate.

The Public Health Report of 1955[104] showed that from 1951 to 1953 there were 2,047 cases of human brucellosis in Iowa. Larger numbers occurred in counties where large packing plants were operating. Male farm workers made up 51% of this group, 22% were packinghouse employees, and 10% were house-

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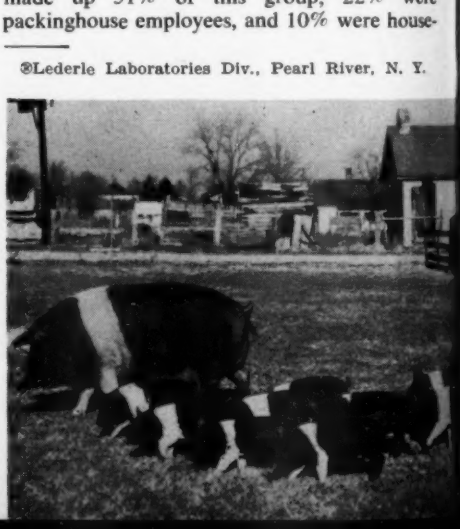

wives. Over 75% of these lived in rural communities and 80% came in contact with animals or animal excretions.

A. H. Quin[105] stated that there is no treatment for a drove of sows undergoing a storm of Brucella abortions. Breeding stock from accredited herds always sell at a premium which more than offsets the costs of testing. At the present time, many swine herds are being tested for brucellosis, leptospirosis and listeriosis before they are offered for sale. Veterinarians are reporting that there is an increased demand for animals from disease-free herds.

J. R. Hay[106] presented the Committee report on swine brucellosis at the 58th annual meeting of the U. S. Livestock Sanitary Association. The Committee outlined three plans for eradication. The basis for certification of a brucellosis-free swine herd would be through negative tests on the entire herd, tests to be made at 30-to 90-day intervals on all animals over six months of age. No agglutination test may be positive in dilution 1:100 or higher. Recertification would be given on a single clean annual retest on the entire herd.

Charles Cox[107] felt that a blood titer is a manifestation of an immune response to some antigen. It does not always denote an immune state, neither does it imply present infection. Other organisms to which swine are subject, such as Proteus and the Pasteurella species, are reported to cross-agglutinate Brucella at times. Therefore, some agglutination tests are difficult to evaluate properly, especially if there is no clinical manifestation of disease or negative case history.

Disease Control Progress Dependent on Further Information

The veterinary profession is aware that the control of brucellosis in swine is a problem of major proportions.

The part played by vectors in the transmission of the disease in swine will have to be studied.

There is a possibility that many more species of animals may be carriers.

We need more practical and accurate methods of diagnosis. The employment of the present diagnostic tests has been largely responsible for the progress that has been made.

At present, there is no reliable immunizing agent available for preventing *Br. suis* infection in swine in the United States. Additional research should be done on preventive vaccines.

A more standardized antigen conforming to a constant standard of sensitivity is needed. At present, cultures that go to make up the antigens are of the smooth form of the organism which can be and are changed by laboratory procedures.

Veterinarians should not rely on the accuracy of any serological test of only a few animals in a herd. Many animals in a suspicious herd should be tested at one time.

The titers of the agglutination tests are often expressed as a function of dilution without reference to unit volume. As a result, titers reported by different laboratories are often not comparable unless sufficient data are given to permit conversion to a unit volume basis.

In order to provide a more uniform test, the titer should be expressed as the number of antibody units per unit volume of undiluted serum. For example: If the test is positive when one uses 1 ml. of serum diluted to 1:1000, the titer of the serum is 1000 (units of antibody per milliliter). This would add more uniformity in reporting the tests but would not accomplish too much because some swine react in low dilutions and yet the organisms may be isolated from their tissues; indicating that it is not always the pigs whose blood react in high dilutions that are the heavily infected animals.

For a number of years, it has been a common practice to assume that, when a sample of serum gives a positive reaction in dilution 1:100 or above, it identifies an infected animal. This assumption may or may not be true always.

It would appear that medicinal agents for the cure of swine affected with brucellosis have yet to be discovered. Swine may abort from causes other than brucellosis. Some swine may be infected with brucellosis but do not always abort. Acute or chronic lameness and stiffness may be attributable to some other disease when the actual cause might be brucellosis.

All adult swine offered for sale for breeding purposes should have at least two tests at 60-day intervals. The blood test should be run in low dilutions.

Great credit for the progress that has been made in the field of research on swine brucellosis should be given to veterinarians in the Agricultural Research Service and to Dr. L. M. Hutchings and his associates at Purdue University.

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The Use Of 11-Ketoprogesterone In The Treatment Of Hypoglycemia And Ketonemia In The Ruminant

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A PRELIMINARY report by Gibbons and Wiggins[1] indicated that 1 to 2 gm. of 11-ketoprogesterone were sufficient to treat successfully clinical cases of acetonemia. Berrier[2] has reported 0.5 to 1 gm. was an effective therapeutic treatment for some cases of pregnancy disease. This paper presents data on the use of 11-ketoprogesterone (ketogestin)® in clinical cases of bovine ketosis and in a laboratory experiment. A preliminary report has been presented by Reber, *et al.*[3].

Materials and Methods

The cows used for these studies came from dairy herds located in the area visited by staff members of the Department of Veterinary Clinical Medicine. Blood samples were collected routinely in the field by drawing them into prepared vials containing appropriate amounts of oxalate and sodium fluoride. Samples were returned to the laboratory and filtrates prepared immediately. Blood ketones were determined by the method of Van Slyke and Fitz[4] and urine ketones by the method of Van Slyke[5]. The blood sugar was determined by using a modified Folin-Wu method[6]. 11-ketoprogesterone was administered subcutaneously or intramuscularly. Glucose was administered intravenously. Other treatments were given as indicated in the case history tables (tables 1-5). In all of the bovine case history tables the day of parturition is considered zero day.

A pregnant ewe weighing 164 lb. was brought into the laboratory. This animal was fasted or fed a poor quality hay for a period of 18 days prior to the zero day in table 6. During this time ketone bodies were present in the blood. The effects of 11-ketoprogesterone were measured by taking a blood sample 24 hours after the administration of the material. The ewe was offered hay throughout the two experiments presented in table 6.

Case Histories

Case A was an aged Guernsey cow weighing 1000 lb. Parturition occurred about December 1, 1952. The cow had shown inappetence for one week prior to first treatment. She was first observed December 25, 1952, at which time weakness, constipation, nervousness, and staggering were noted. Lactation had ceased. Body temperature was normal. A qualitative urine ketosis test was positive. There was no other apparent complication. The cow was

TABLE 1. The Blood and Urine Ketone Levels and Treatment of Bovine Case A

Days	Blood Ketones	Urine Ketones	Treatment
43	66 mg.%	20	4 gm. ketogestin subcutaneously
44	78	21 g./l.	2 gm. ketogestin subcutaneously
45	70	17	1000 ml. 40% glucose I.V.
47	24	3	1000 ml. 40% glucose I.V.
50	0	0	1500 ml. 40% glucose I.V.
51			500 ml. 40% glucose I.V
52	6	0	2000 ml. 5% glucose I.V.
54			500 ml. 40% glucose I.V.
56			500 ml. 40% glucose I.V.
57		2	
60	0		500 ml. 40% glucose I.V. 1.5 gr. strych. sulp. orally b.i.d. for 10 days

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given 500 ml. of 40% glucose solution and 500 ml. of 20% calcium gluconate intravenously. On December 27, 1952, 1000 ml. of 40% glucose was injected intravenously and 4 oz. of sodium propionate given b.i.d. for six days. December 31, 1952, the cow was given 4000 ml. of 10% glucose i.v. Appetite and milk production improved. January 13, 1953, the cow relapsed. Blood and urine ketone body levels and treatment on the given days following parturition are presented in table 1. The blood ketone level increased following the initial use of 4 gm. of 11-ketoprogesterone. The level of blood ketones did not decrease within 48 hours following the use of this agent. Forty-eight hours following the use of glucose ketone body level in blood dropped from 70 to 24 mg.%. In this case, the most effective treatment was glucose, and 11-ketoprogesterone appeared to have no beneficial effect. The cow lived, but recovery was unsatisfactory.

Case B was an aged Brown Swiss cow weighing 1,400 lb. She had a history of ketosis on previous lactation and high production records. Parturition occurred February 27, 1953. The cow had reduced appetite, reduced lactation, weak rumination, and temperature of 102.2 F. There was no other apparent complication. Blood and urine ketone levels and the treatment on the given dates are presented in table 2. The most effective treatment was glucose. The cow recovered to full production.

TABLE 2. The Blood and Urine Ketone Levels and Treatment of Bovine Case B

Days	Blood Ketones	Urine Ketones	Treatment
9		4 g./l.	
11	46 mg.%	7	1 gm. ketogestin I.M.
12	41	3	1 gm. ketogestin I.M. plus 1500 ml. 40% glucose I.V.
15	46	8	1.5 gm. ketogestin I.M. plus 1 gal. 20% glucose I.V.
(2 hr. after infusion)	49		
18	57	8	1 gal. 40% glucose I.V.
22	43	8	7 pints 40% glucose plus 250 ml. chlorodex I.V.
(after treatment)	24		
28	56	6	1 gal. 40% glucose I.V.
(after treatment)	41	0	
29	42	0	1 gal. 40% glucose I.V.

TABLE 3. The Blood and Urine Ketone Levels and Treatment of Bovine Case C

Days	Blood Ketones	Urine Ketones	Treatment
10	52 mg.%	2 g./l.	2 gms. ketogestin I.M.
12	32	3	2 gms. ketogestin I.M. plus metritis treatment with uterine infusions.
13	43	3	

Case C was an aged Guernsey weighing about 1000 lb. Parturition occurred February 11, 1953. The cow was observed ten days postpartum. Symptoms were inappetence, little milk production, constipation, temperature of 102.4 F., metritis with enlarged, flabby uterus, and positive qualitative urine ketosis test. The blood and urine ketone body levels and treatment on the given days are presented in table 3. Recovery was rather slow, but steady, with the cow daily increasing in milk production and appetite.

Case D was a cow that calved November 24, 1952. At the time seen this animal had a fair appetite. Blood and urine ketone body levels and treatment on the given days postpartum are presented in table 4. The cow recovered.

Case E was a three-year-old Holstein that calved February 26, 1953. She appeared normal until the 14th day following parturition, when the following symptoms were noted: Inappetence, reduced milk production, rumen atony, temperature 101.8 F. There was no other apparent complication. On the 18th day the cow exhibited inappetence and a positive qualitative ketonuria. The blood ketone and blood sugar levels and treatment on the given dates are presented in table 5. Within 24 hours following injection of 11-ketoprogesterone improvement in appetite and milk production was noted. Recovery of appetite and milk production was rapid and without relapse. This is the only cow that showed a good clinical response to 11-ketoprogesterone. It should be noted the blood ketones were not high and blood sugar not low initially in this case.

The ewe with induced pregnancy disease had blood sugar and ketone levels as presented in table 6. In experiment 1, 500 and 750 mg. of 11-ketoprogesterone had a variable effect upon blood glucose and ketone levels. This was also true in experiment 2. In experiment 2, the administration of 2 gm. of 11-ketoprogesterone raised the blood sugar level and slightly decreased the blood ketone levels. The effect of the 11-ketoprogesterone was not consistently positive. The dramatic effect of glucose, even in the severe condition, was demonstrated by the reduction of the blood ketone level to zero and the high blood glucose level.

Summary

Five clinical cases of bovine ketosis were treated with 11-ketoprogesterone (ketogestin) alone or with glucose and/or other substances. One cow, with mild ketosis showed improvement within 24 hours after receiving 4 gm. of the hormone substance and recovered without additional treatment. A more severe case of ketosis was given 2 gm. for each of two treatments. This case slowly improved 72 hours after the first treatment. In three cases of ketosis the 11-ketoprogesterone was of negligible value. Glucose therapy was found to be most effective in overcoming ketosis of the latter three cows. Hypoglycemia and ketonemia were produced in a pregnant ewe by fasting or feeding hay only. The administration of 11-ketoprogesterone to this ewe lowered blood ketone levels and raised blood sugar levels, but not consistently.

TABLE 4. The Blood and Urine Ketone Levels and Treatment of Bovine Case D

Days	Blood Ketones	Urine Ketones	Treatment
21	72 mg.%		1.2 gms. ketogestin I.M. stilbesterol I.M.
22	85	17 g./l.	1.2 gms. ketogestin I.M.
23	85		1.2 gms. ketogestin I.M.
25	98		1.2 gms. ketogestin I.M.
26			4 l. 12.5% glucose I.V. 10# Na propionate
27			1 l. 20% glucose I.V.
28	28		1 l. 20% glucose I.V.

TABLE 5. The Blood and Urine Ketone Levels and Treatment of Bovine Case E

Days	Blood Ketones	Blood Sugar	Treatment
19	13 mg.%	37 mg.%	4 gms. ketogestin sq.
20	3	47	
21	5	50	

TABLE 6. The Blood Sugar and Ketone Levels and Treatment of a Sheep with Induced Pregnancy Disease

Days	Blood Ketones	Blood Sugar	Treatment
		Experiment 1	
0-5			Fed only poor quality hay
3	47 mg.%	17 mg.%	
5	51	23	500 mgm. ketogestin + hay
6	37	32	Body wt. 154; 750 mgm. ketogestin
7	48	15	750 mgm. ketogestin + hay
8	25	28	
		Experiment 2	
18	53	13	Fed hay, ewe down 1 gm. ketogestin
19	59	8	2 gms. ketogestin
20 s	51	20	975 ml. 40% glucose I.V. 800 gms. cerelose orally
21 A.M.	0	400+ mg.%	
21 P.M.	Twin lambs (dead) by caesarean		
22	Ewe died		

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EDITORIAL COMMENTS

Artificial Insemination

The potential of artificial insemination, particularly of dairy cows, was emphasized by a few veterinarians and research workers in animal industry over 20 years ago. Practitioners were reluctant to encourage the practice or to participate in the program that has since made remarkable progress. Today, thousands of herds are composed entirely of females and are serviced exclusively by artificial insemination. Accomplishments have exceeded forecast. Production records have increased more rapidly than could have been accomplished otherwise, savings have been effected for individual dairymen and owners, and a significant contribution has been made to disease control.

The last mentioned was emphasized by Dr. James Pirie, owner and manager of the Eastern Iowa Breeders, Cedar Rapids, Iowa, (*Iowa Vet.*, 27:36 [May-June], 1956). The bull health program outlined by Doctor Pirie for his stud is prime insurance against disease spread. These are as follows:

1. Bulls are inspected upon the farm where they have been used (and proved) as well as females served. Females are examined for both pregnancy and existence of genital disease before bull is purchased.

2. Negative tests are required also for brucellosis, tuberculosis, leptospirosis, vibriosis, trichomoniasis, and paratuberculosis.

3. Semen is collected and examined for quality and quantity and checked bacteriologically for existence of pathogens.

4. Bulls are kept in quarantine upon arrival at the stud for 30 days. Some tests indicated are repeated during this period.

5. Tests and periodic examinations are made at intervals throughout the year.

6. Sanitary precautions are taken for collecting and handling of semen.

7. Technicians are especially trained in technic and are required to wear sterile rubber gloves and thoroughly cleaned boots.

8. Abnormal conditions observed during artificial insemination are called to the owner's attention with the recommendation that they be referred to the attending veterinarian.

Selection of Notifiable Disease

Elsewhere in this issue the institution of a monthly national morbidity and mortality report is commended. However, the inclusion of dourine and glanders in this report appears to be ill-considered and archaic.

It is understood that this report must be brief. It should, however, include contagious diseases of meat producing animals and those transmissible to man that are problems of todays veterinarians and livestock growers. One wonders why leptospirosis, vesicular stomatitis, rabies, hog cholera, swine erysipelas, and perhaps mucosal disease of cattle, atrophic rhinitis, contagious ecthyma, transmissible gastroenteritis and some others, not to mention some important poultry diseases, are not included.

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Olympic Equestrian Games

Final trials in preparation for The Olympic Games in Stockholm, Sweden, June 10-17, 1956, were run at Tryon, North Carolina, March 3-17, 1956.

For the benefit of those who do not know about the rules and requirements of horses and riders participating, General J. T. Cole, general manager of the U. S. Equestrian Training Center in Tryon prepared the outline for competition this summer in Sweden. The Games present three competitions: Grand Dressage, Three Day Event, and the Prix de Nations.

The Grand Dressage contest is one in which each rider executes an exact school ride from memory.

The Three Day Event includes dressage ride (first day); endurance ride (second day); and jumping contest (third day).

The Prix de Nations is purely a jumping competition.

The United States Equestian Team is supported entirely by contributions of friends throughout the nation. Donations are tax deductible and may be sent to Brig. Gen. F. W. Boye, Treasurer, Warrenton, Virginia.

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Vaccination of Pregnant Sows

When vaccination of pregnant sows for hog cholera can not safely be delayed, a full dose of antiserum should be administered regardless of the vaccine or virus used, according to authority of the Agricultural Research Service.

Equine Practitioners Association Holds Annual Meeting

The American Association of Equine Practitioners held its second annual meeting in Chicago, December 16-17, 1955. Over 60 members and other veterinarians interested in equine medicine, especially race horse practice, from throughout the United States and Canada, were in attendance.

Dr. W. F. Guard

The first day's program was held at the La Salle Hotel and included an address by the president, Dr. M. L. Scott, Akron, Ohio, and reports of officers and committees plus the following papers: Dr. E. A. Churchill, Centerville, Maryland, (removal of fractured fragments of the proximal sesamoid bones); Dr. J. F. Herrick, Mayo Clinic, Rochester, Minnesota (uses, limitations and dangers of ultrasonic therapy); a panel discussion on respiratory diseases led by Dr. T. E. Dunkin, Chicago, and a panel discussion on Association problems led by Doctor Scott.

The second day's program was presented at Rolling Acres Equine Hospital and included talks by Drs. Neal D. Lusk, Chicago (treatment of equine digestive disturbances); Paul J. Meginnis, Chicago (nasal irrigations for sinusitis); H. N. Davis, Lexington, Kentucky (some common diseases of the newborn foal); Col. John H. Rust, University of Chicago (radiation therapy, facts and fantasy), and Dr. Robert Getty, Iowa State College (local anesthesia and nerve blocks).

Doctor Herrick presented fundamental concepts of ultra-sound and pointed out the dangers of indiscriminate ultrasonic therapy showing how the misuse of this agent can lead to extensive tissue damage, including bone degeneration; this type of therapy can be useful, however, if it is expertly given and controlled.

Colonel Rust described the basic facts of radiation and emphasized the limitations of its use and the hazards to the patient as well as the veterinarian.

The entire technical program was excellent and stimulated much discussion. There was also discussion of how A.A.E.P. could best proceed with its program and stated objectives see (*Jour. Am. Vet. Med. Assn.*, 127:276 [Sept.], 1955) and a number of suggestions were made as to how graduate training in equine medicine and surgery might be arranged for young veterinarians interested in this specialized field, also short courses and other postgraduate training for veterinarians already engaged in equine practice. The Assoication also hopes to stimulate more interest in and support of research on equine disease problems.

One of the most serious and vexing problems confronting A.A.E.P. and its members is the relationship between veterinarians engaged in race horse practice and the racing commissions. The Association's officers will endeavor to draft a suggested code or set of regulations governing these relationships for submission to members and eventual adoption. This area is admittedly difficult to define and agree upon but it is hoped that an acceptable solution will be worked out in time.

At the conclusion of the meeting, Dr. W. F. Guard, Ohio State University, was installed as president for the ensuing year and Dr. T. E. Dunkin, Chicago, as secretary-treasurer, succeeding Dr. J. B. Solomon, Cleveland. The new president-elect is Dr. Horace N. Davis, Lexington, Kentucky. Doctor Solomon is the secretary-treasurer-elect.

A number of new members were admitted and several membership applications were received during the meeting. The A.V.M.A. was represented officially by President Floyd Cross, President-elect Wayne O. Kester, Executive Board members J. M. Arburua, W. G. Brock and F. B. Young and executive-secretary J. G. Hardenbergh.

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Enterohepatitis induced by feeding *Heterakis gallinae* ova to turkeys was effectively prevented by additions of furazolidone (furoxone® Eaton) at concentrations of 0.01 to 0.02% in the ration in the experience of C. Horton-Smith *et al.*, reported in the *Journal of Comparative Pathology* for January 1956.

San Antonio, Texas Host City for A.V.M.A. 1956 Convention

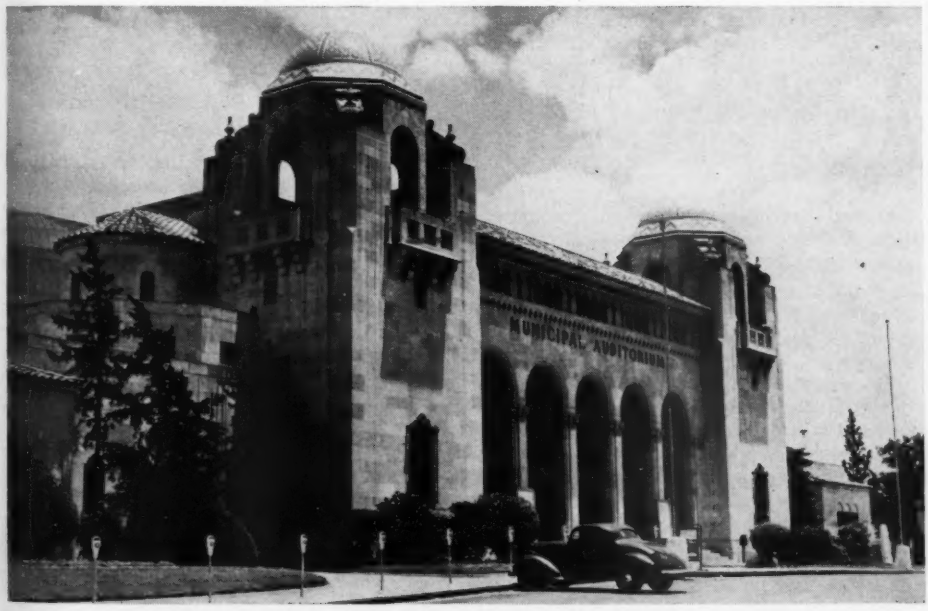
Traditionally held in late summer, the 93rd annual meeting of the American Veterinary Medical Association will set two precedents; an October meeting date, and Texas as the chosen site. This year will be the first time that a Texas city has been selected as host. The October meeting date (Oct. 15-18, 1956) was planned because of most favorable season. It is the first time in 35 years that any meeting was held later than early September.

Historic San Antonio, once a Spanish stronghold and capital of the province of Tejas in New Spain, is now the commercial and financial center of the empire of south and west Texas, an area larger than New England and New York combined. It is the third largest city in Texas having a population in excess of 500,000.

The first permanent settlement within the limits of the modern city was established in 1718 on the founding of the Mission of San Antonio de Valero. There followed a colorful history of colonization of the region by Spainards and Mexicans from the south and later, pioneers from the north and east—ranchmen, soldiers, missionaries. All left their influence on this unique city where one may see actual evidence of the culture of days past amidst towering buildings of a commercial center and facilities of a great market center for livestock.

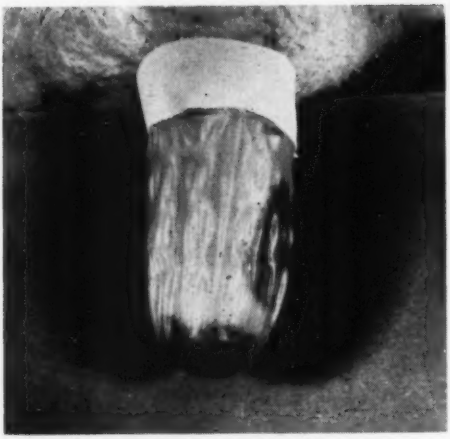
No visit in San Antonio is complete without a pause at The Alamo (chapel of Mission San Antonio de Valero), shrine of Texas liberty. Located in the center of the downtown district, the preserved structure is referred to as the "Cradle of Texas Liberty". Within its walls, enclosing an area sufficient to accommodate 1,000 men, Colonel William Barrett Travis of the Texas Army with 182 men made a gallant and heroic defense against a Mexican Army under Santa Anna.

Postconvention tour arrangements are being planned to Mexico City by Happiness Tour, Inc., Chicago and an adjourned final session will be held in the splendid facilities of the Veterinary School, National University of Mexico, at University City. A selection of tours will be offered members early this summer.



Covering 6½ acres, the San Antonio Municipal Auditorium was built as a memorial to World War 1 dead. Architects of this imposing structure of Mediterranean design were awarded honors for its excellence. A huge asbestos curtain on the 75-foot stage was painted by Hugo Pohl to depict the arrival of the Spaniards in San Antonio. Seating capacity is given as over 6,000.

Bandage for Teats



The photograph above illustrates a practical dressing for cow's teats suggested by Dr. I. A. Schipper, Department of Veterinary Medicine, North Dakota Agricultural Experiment Station, Fargo.

Doctor Schipper writes that he has found this to be an excellent means of holding medication in place on an injured teat as well as protecting it from dirt and filth following trauma or freezing. An ordinary 6-in. clean milk strainer pad makes a most efficient teat bandage and protects the latex prophylactic which is attached to the base of the teat or udder with a single strip of adhesive tape part of which is in contact with the prophylactic and part with the base of the teat or udder.

Several practitioners who have employed these prophylactics have reported them quite well adapted for the purpose.

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Rabies Antiserum Test

An opportunity was presented a World Health Organization medical team recently to field-test efficacy or rabies antiserum. A rabid wolf attacked 29 villagers of Sabneh on the road from Teheran to Baghdad inflicting many severe wounds about the heads of victims. One child of six years was severely bitten through the skull. Of 13 persons who received serum, according to *Time* (Mar. 19, 1956), only one died. Of five with head wounds who received vaccine only, three died of rabies. Among the 25 who are alive today, is the six-year-old lad who is claimed to have survived the most severe rabies challenge of any person living.

Veterinarians Needed for Positions of Veterinary Poultry Inspectors

The Poultry Inspection Section of the United States Department of Agriculture is in need of qualified, graduate Veterinarians to fill vacancies.

Due to the continued expansion by the Poultry Industry in the evisceration and processing of ready-to-cook poultry under federal inspection, openings are available in various sections of the country.

Entrance salary is $5,200 per annum based upon a 40 hour five-days work week, except that consideration may be given to an entrance salary of $5,440 per annum when in the judgment of the Administration, the applicant has qualifications for a higher grade. Ordered overtime in excess of this is compensated for.

No written examination is required. Appointments are made on the basis of applications submitted. Opportunities for advancement are excellent.

Veterinarians interested in part time or seasonal employment are invited to apply, as some plants operate on a seasonal basis.

Address inquiries to Agricultural Marketing Service, Inspection Br., Poultry Div., USDA, Washington 25, D. C.

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Klebsiella Mastitis

(Continued from page 261)

satisfactory in separating the bacteria. It was suggested that the non-motile forms which do not liquefy gelatin, heretofore classified in both genera, Klebsiella and Aerobacter, be placed in the former genus and the latter genus be redefined as a motile, liquefying group with *Aerobacter cloacae* as the type. This conclusion by Edwards and Fife would be confirmatory for the classification of the organism which has been discussed in this paper as a species of Klebsiella.

It is emphasized that all cultures of Klebsiella isolated from the mastitis described here were of identical biochemical properties. The organisms were characterized by non-motility, capsule formation and failure to liquefy gelatin. Other distinctive features of the cultures were negative tests for indole, methyl red, Voges-Proskauer, hydrogen sulfide and positive citrate, urea, and nitrate tests.

The cultures identified from the bovine mastitis cases are believed to be a variant of *Klebsiella pneumoniae*.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Trade Names of Pharmaceuticals

It is confusing, at least to this writer, and also to some practitioners, teachers, and others to attempt to interpret various trade names adopted by commercial producers to identify their particular product instead of using the approved chemical or pharmaceutical name. As an example of this situation, there are others, tetracycline is discussed as achromycin®, polycycline®, polyotic®, steclin®, tetracyn®, panmycin®, et cetera. We have listened to discussions in which various speakers were using the same product, but in their discussions, because they used different trade names, it seemed to listeners that different products were being called to their attention. Simplification should be the order of the day.

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White Scours in Calves

Some theories developed in research projects are of interest and of potential value. In regard to white scours in calves, the following are points of significance:

1. The disease is due to a strain of *Bact. coli* (*Escherichia coli*) or it is, in fact, a colibacillosis or a colisepticemia.

2. A newly born calf derives its principal passive resistance to infection from the consumption of an ample supply of its dam's globulin-containing colostrum.

3. If a cow is subjected to prepartum milking, her supply of antibodies and globulins in the colostrum is reduced materially, and as a result, the supply of antibodies and globulins to the newly born calf is limited, and specific protection lessened.

4. If a cow, immediately preceding calving, is transferred to a maternity stall, or other entirely new environment, and has not had the opportunity to develop specific substances in the colostrum against possible infections from the new surroundings, the new nursing calf may suffer correspondingly.

5. If a newly born calf is removed soon after its birth from its immediate surroundings to a new location, it is thus exposed to new infections for which there are no antibodies or resistance, or against which it has no passive resistance.

6. In the newly born calf, the potential disease producing colon organisms are largely in the small intestines. Therefore, it is important to provide this anatomic region an ample supply of maternal antibody—and globulin-containing colostrum for several days as soon as possible after birth.

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Sewage Treatment Needs Improvement

Since many cities are considering the advisability of constructing sewage disposal plants rather than dumping raw sewage into neighboring rivers, and as veterinarians are frequently consulted about matters of this nature, it is pertinent to call attention to the results of some research work that has been reported recently. K. E. Jensen reported in the *Bulletin of the World Health Organization* (WHO), 10:171, 1954 that it took from 11.5 to 15 months to effect elimination of tuberculosis organisms in sludge drying beds by addition of 10 mg. of chlorine per liter of activated sludge, 0.5% of saponated cresol solution, or 0.1 to 0.2% formalin. Kelly, Clark, and Coleman reported in the *American Journal of Public Health* (Nov. 1955) that they recovered tuberculosis organisms from swabs exposed in river water receiving effluents from sewage treatment plants for from one to two hours, by guinea pig inoculation. Poliomyelitis virus was also recovered from the same type of river water by resorting to a swab method of recovery rather than by dipping the water to be examined from the river. From the foregoing it appears that sewage that has undergone primary and secondary treatment in a so-called modern sewage disposal plant is not necessarily free from disease producing organisms. Viruses were not entirely eliminated after passing the sewage through a trickling filter and simultaneous sedimentation and chlorination. In this connection we have been informed that the principal objective at this time in the modern handling of sewage is to avoid jeopardizing marine life by excessive stream pollution, and not to make the river water entirely free from bacterial life.

VETERINARY NUTRITION

MORRIS ERDHEIM, D.V.M.
Chicago, Illinois

Antibiotics in Lamb Feeds

The addition of certain brood-spectrum antibiotics to lamb rations had no effect on the incidence of pneumonia in animals moved to feed-lots in a test conducted by McGowan at the California Veterinary College. Details of the test were described at the mid-winter conference of the California State Veterinary Association. Lambs were fed varying levels of the antibiotic in pellets containing 55% alfalfa, 37% barley, and 8% molasses.

The group which showed the greatest average daily gain and the least cost per pound of gain was fed 10 mg. of aureomycin® per pound of pellets. This was fed throughout the feeding trial.

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Distribution of DPPD Stopped by F.D.A. Action

DPPD (diphenyl-p-phenylenediamine) is used as an antioxidant in mixed feeds. The commercial grade has been used extensively in poultry rations. An announcement from the Food and Drug Administration in Washington asks the feed industry to discontinue its use for this purpose. The reasons for this request are given in the following complete text of the F.D.A. announcement:

"The Food and Drug Administration has recommended to the basic manufacturers and distributors of DPPD (diphenyl-p-phenylenediamine) that distribution of the present commercial grade of the chemical now used in poultry feeds be stopped, and that unused lots in possession of distributors and feed manufacturers be recalled."

DPPD is an effective antioxidant. It has been used in substantial quantities of poultry feeds during the past two years primarily to protect the vitamin E content of such products. A deficiency of vitamin E in the rations of poultry is likely to result in a disease known as encephalomalacia or "crazy chick disease." This condition has been the cause of substantial losses to poultry raisers in various sections of the country.

Earlier studies with DPPD indicated it was a harmless poultry feed additive. Based on these studies, feed manufacturers and suppliers were advised that F.D.A. had no reason to question the suitability of DPPD as an ingredient.

More recent studies with the commercial grade of DPPD currently used in poultry feeds have revealed that the product causes pronounced toxic effects when fed to pregnant rats which is the basis for recommendations for its discontinuance.

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In his paper read to the Wisconsin Nutrition School for Feed Men, Doctor Bird of the University of Wisconsin touched on a subject which might give some indication of the commercial use of high antibiotic feeds. Twelve feed companies which operate in more than one state (all operate in Wisconsin) were selected and registration of their feeds revealed the following: Of the 12 companies, eight registered high level antibiotic feeds; seven companies registered one or two such feeds, but one company registered eight. The eight different feeds resulted from the addition of antibiotic, in different combinations with coccidiostatic drugs, to various types of poultry feeds. Four companies each registered only one high level antibiotic feed, and in every case it was a general purpose mash for poultry or poultry and swine.

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Writing in the December 1955 issue of *Eastern Breeder and Broiler Grower* on broiler management, Dr. John Snyder refers to the use of high level antibiotic feeding in the modern broiler programs. Research indicates that such practices are justified only "If the disease level is high. To feed high level antibiotics continuously is much like taking an aspirin every morning—just in case you might have a headache that day." On the subject of nutrition and management, he points out that the limiting factor in feed conversions on the average farm today is not the feed, but the management. "While the feed is capable of doing 100 miles an hour, some people are putting a 50-mile-an-hour governor on it by poor management."

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VETERINARIAN WANTED: for long established small animal practice. Profit sharing arrangement. Address: Eastman Animal Clinic, 672 N. E. 79 St., Miami, Fla.

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WANTED: January and March, 1956 issues of VETERINARY MEDICINE. Your subscription will be advanced one month for each copy. Mail to VETERINARY MEDICINE, Suite 803 Livestock Exchange Bldg., Kansas City 2, Missouri.

EXAMINATIONS

The Florida State Board of Veterinary Examiners will hold an examination June 18, 19, and 20, 1956 at the Everglades Hotel, Miami, Florida. Address all inquiries to Dr. E. L. Matthews, secretary of the Board, Box 141, Palatka, Florida.

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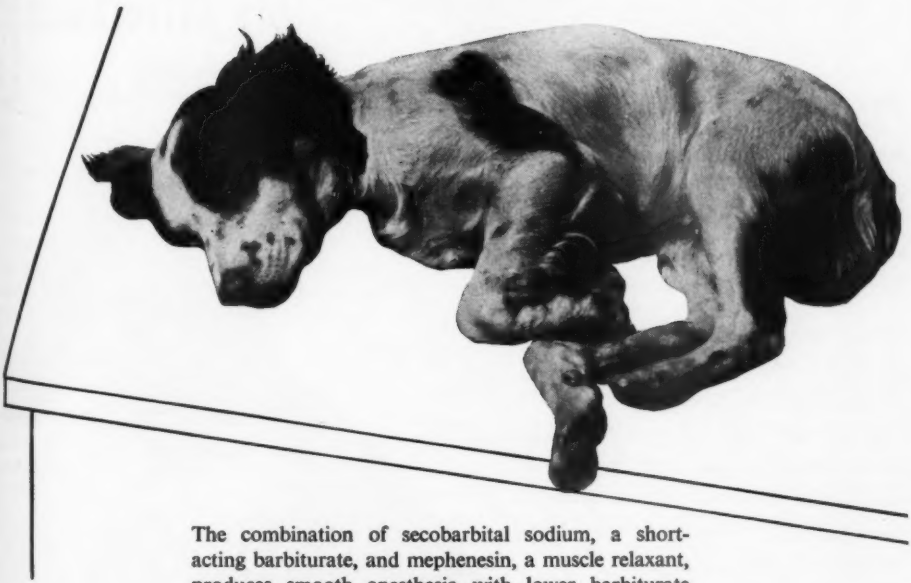

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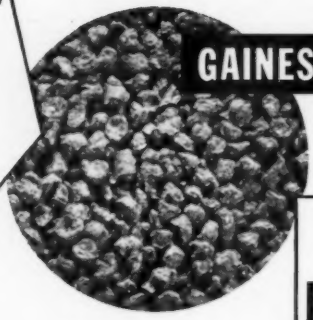

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Purina Mills Founder Victim of Heart Attack

William H. Danforth, founder and chairman of the board of Ralston Purina Company, died of a heart attack on Christmas eve at his home in St. Louis. He was 85 years of age.

Mr. Danforth had been active until he was stricken while waiting with his family for the arrival of Christmas carolers. He was founder and president of the National Christmas Carols Association.

One of the pioneers of the commercial feed industry, Mr. Danforth became associated with the Robinson Danforth Commission Company in St. Louis in 1894. The principal product of the small business was a feed for horses and mules.

When the mill was destroyed by a tornado in 1896, Mr. Danforth obtained a $10,000 loan to rebuild. In its new mill the company started making a granulated whole-wheat breakfast cereal for which the name "Purina" was coined. The Ralston Health Club, a popular movement of the time, endorsed the product, and the cereal was renamed Ralston Purina. Mr. Danforth bought out his partners and became the company's moving force. In 1902 the company was refinanced, and it took the corporate name of Ralston Purina Company.

Since its earliest days, the Ralston Purina Company has manufactured commercial feeds for livestock and poultry, and breakfast cereals. The Company now has 47 mills scattered over the United States and Canada. Livestock and poultry farmers feed nearly 4,000,000 tons of the Purina Chows each year.

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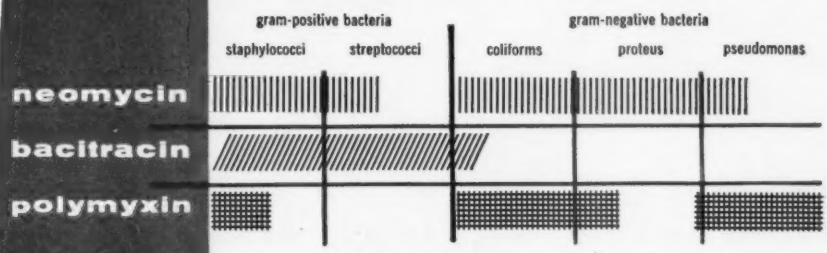

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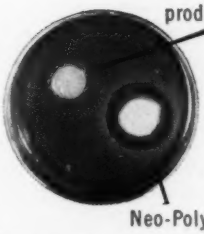

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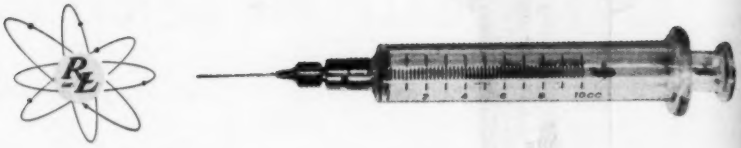

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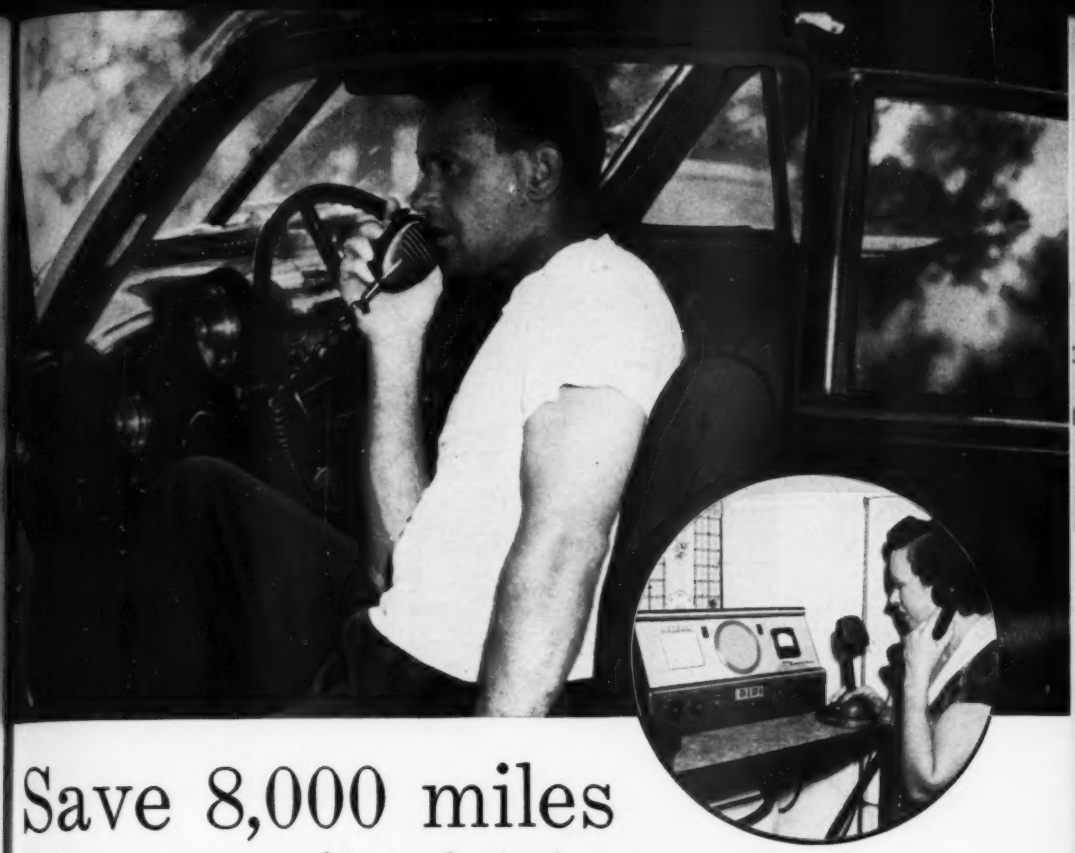

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Intramuscular, 100 mg.-500 mg.-1 Gm.-5 Gm.
Ophthalmic Ointment 1%, 6 x 1/8 oz. tubes
Topical Ointment 3%, 1 oz. tubes
Mastitis Ointment, 1/4 oz. tubes

Soluble Powder (Tinted), 1/4 lb.-1/2 lb.-1 lb.-5 lb.
Powder 2%, 35 Gm.
Tablets, 50 mg.-25's-100's-100 mg.-25's-100's-250 mg.-16's-100's
Capsules, 50 mg.-25's-100-100 mg.-100's-250 mg.-16's-100's

Available to Veterinarians Only

ERLE LABORATORIES DIVISION *AMERICAN CYANAMID COMPANY* PEARL RIVER, N.Y.

Why D-L-V Porcine Origin Vaccine is so Well Received.*

Veterinarians throughout the country appreciate and trust **D. L. V.** Porcine Origin, Modified Live Virus Vaccine because of the solid immunity it produces . . . coupled with the added safety with which it can be used when simultaneously injected with serum.

The manifestation of these qualities in **D. L. V.** was evident in the successful vaccination of millions of swine.

**Diamond Laboratories Vaccine*

DIAMOND

DIAMOND LABORATORIES
DES MOINES, IOWA

SERVING THE GRADUATE VETERINARIAN EXCLUSIVELY

British Veterinarians on American Tour

Two of Britain's most eminent veterinarians arrived in the United States at the end of March to undertake a comprehensive tour of university, state, and industrial research centers devoted to animal health. Dr. W. R. Wooldridge and Dr. K. C. Sellers, both of that unique and independent educational and research organization the Animal Health Trust, are also taking the opportunity to study veterinary public health services with a view to reporting to the Worth Health Organization.

Dr. W. R. Wooldridge is a graduate in veterinary medicine, chemistry, and biochemistry. He has been a prime mover in the reorganization of veterinary medicine and research in Great Britain. As President of The Royal College of Veterinary Surgeons in 1955 he was the acknowledged head of his profession in Britain. He is also a past president of the British Veterinary Association and the Veterinary Research Club. An eminent educationist, a senator of the University of London and a governor of three of its constituent colleges, Doctor Wooldridge is Chairman of Governors of Birbeck College. For many years he was on the staff of the London School of Hygiene and Tropical Medicine, where he taught biochemistry and nutrition. He is a gifted lecturer on animal disease and welfare and on education in the veterinary field.

Doctor Wooldridge is the founder of the Animal Health Trust and is now a Trustee, Chairman of Council and the Scientific Director. The Trust is an independent organization founded (without funds) in 1942 and having as its aim the improvement of the health and productivity of all animals without regard to the purpose for which man keeps them. The work of the Trust is divided into two main parts; an educational section which helps to finance veterinary students at universities and awards postgraduate scholarships to enable newly qualified veterinarians and scientists to get further experience in universities and train for research positions. Sometimes these students are sent abroad, and four of them have visited here for a period of research. Since its foundation the Trust has given 100 grants to veterinary students and awarded 92 research scholarships.

The other section of the Trust work is to run research centers concerned with particular

(Continued on page XL)

MASON'S New KENNEL RUNS
NOW AVAILABLE
For SMALL ANIMAL HOSPITALS
Quickly Erected - NO POSTS REQUIRED
Can be set on concrete or wood floors or directly upon the ground, joining to, or independent of Building. Composed of strong, self-supporting Fence sections and Gate Units with GATES BUILT-IN and Lockable Latches.
FREE CATALOG
Send for Free Catalog with Low Direct Factory Prices of Kennel Fences of all kinds, Kennel Doors, Cages and Hospital Equipment.
THE MASON FENCE CO., Box 77, LEESBURG, OHIO

In instances of persistent diarrhea in cattle, do not overlook Johne's disease as the cause.—*H. S. Marsh, D.V.M.*

▼ ▼ ▼

no side effects from
THERAPOGEN
the proven effective germicidal agent
You'll find THERAPOGEN virtually free of side effects and toxicity. Its completely effective yet mild cleansing action has been found excellent for obstetrical work by veterinarians for many of the finest horse breeding farms in Kentucky. Inexpensive THERAPOGEN may be ideal for your needs, also.
Write, wire or call today for samples, literature and the name of your nearest distributor.
THEO. MEYER Est.
213 SO. 10TH ST., PHILA. 7, PA.

SPECIAL
DAIRMOL DUSTING POWDER
FOR GRANULAR VAGINITIS

Antiseptic Astringent

"THE DAIRMOL WAY"

Compounded under the direction of veterinarians of exceptional experience. Highly recommended by leading herdsmen as the best treatment for the purpose.
Also mfrs. of LIQUID Dairmol Antiseptic and Deodorant.

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23rd and Locust Sts. PHILADELPHIA 3, PA.

M·A·C

Quick relief for Bone, Bursal or Tendon Lameness
Single Bottle.....$2.00
3 and 1 free.....5.00
6 and 2 free.....9.00
12 and 4 free.....17.00
24 and 4 free.....28.00

CARTER-LUFF CHEMICAL CO.
Hudson, N. Y.

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(Continued from page XXXIX)

animals. At present four such centers exist for horses, dogs, poultry, and farm livestock respectively. Dr. K. C. Sellers is director of the farm livestock station. He was also trained at the universities of London and Cambridge. At present, he is secretary of the Veterinary Research Club. He is well known for his work on diseases of farm animals, in particular infection and nutrition. Laboratories are at present being built for his station in a rural area 30 miles from London. During his visit he wants to make contacts among scientists in his field with the special aim of discussing animal health problems with his American counterparts. Indeed this is the main purpose of the visit of both these distinguished veterinarians, as they believe that personal contacts and exchange of information will be beneficial to those concerned with veterinary medicine in both America and Britain.

▾ ▾ ▾

Automation means machines to control machines.

Armour Veterinary Laboratories Joins Associated Veterinary Laboratories

Armour Veterinary Laboratories, Kankakee, Illinois, have associated themselves with the Associated Veterinary Laboratories, a group active in public relations for veterinarians.

Billboard advertising, encouraging veterinary service for livestock health, has been a feature of the Armour Veterinary Laboratories' public relations program for several years and which have become a familiar sight in all parts of the nation.

"Our Smallest Servants"

Our Smallest Servants designates a handsome 32-page book on fermentation chemistry, prepared by Chas. Pfizer & Co., Inc., Brooklyn, New York.

The book, itself an example of fine printing craftsmanship, describes interestingly progress of fermentation from "a primitive art without science" to present day scientific production of many useful products through fermentation chemistry. These include, in addition to antibiotics and vitamins, essential materials for plant sprays, animal feeds, paints, plastics, cosmetics, candy, and rust removers, to name a few. Selected mold organisms become servants of man by scientific control exercised by the biochemical engineer. A gallery of famous personalities and a bibliography are included for the interested reader.

▾ ▾ ▾

Blood cell count and hemoglobin determination on Thoroughbreds may give clue to optimum racing condition. Such studies of those reported by Schlichting *et al.* in VETERINARY MEDICINE, 51:151 (Apr.), 1956, established normals specific for the breed.

Silver King VETERINARY CHUTE

The choice of leading veterinarians from coast to coast! The only chute in the world with front and side opening!
• CATTLE CHUTES
• CALF TABLES • SCALES
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Free Catalog

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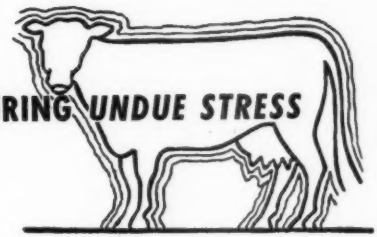
OKLAHOMA CITY OKLAHOMA

FOR STIMULATING ANIMALS DURING *UNDUE STRESS*



dynamone

ARMOUR

Primary ketosis of dairy cows (if glucose therapy is utilized)*
Dehydration
Fever toxemias
Exhaustion or fatigue
Pre- and postoperative support
Management of convalescence
Cachexia

***Dynamone (Armour) cannot be considered as a replacement for Adrenomone in severe cases of primary ketosis.**

2-way therapeutic action

An efficient and economical physiological stimulant, containing 100 U.S.P. units of ACTH in a 50% glucose solution. Dynamone (Armour) provides the animal with a two-fold source of energy (1) REPLACEMENT THERAPY glucose being an immediate available energy source.

(2) STIMULANT THERAPY — ACTH serves as a stimulant for adrenals providing the entire spectrum of gluco-corticoids (compound E-and F-like steroids) which in turn accelerate the conversion of fat and protein to glucose and glycogen.

Dynamone (Armour) maintains the blood sugar concentrations at normal or above normal levels for eight or more hours and is *four or more* times as effective as glucose alone in maintaining blood sugar levels.

Package information: Dynamone (Armour) is available in cartons containing 6 and 12 x 500 cc. bottles.

ARMOUR **Veterinary Laboratories**
A Division of Armour and Company
520 N. Michigan Ave., Chicago 11, Ill.

Now available to the veterinary profession...

MYSTECLIN

MYSTECLIN *contains today's broadest broad spectrum antibiotic*

TETRACYCLINE (Steclin)

PLUS *the first safe, effective antifungal antibiotic* **NYSTATIN** (Mycostatin)

all in one capsule!

MYSTECLIN is a *new* Squibb antibiotic preparation offering veterinarians—for the first time—the therapeutic advantages of broad anti-microbial spectrum, combined with protection against monilial superinfection.

Each capsule of Mysteclin contains 250 mg. Tetracycline HCl and 250,000 units Nystatin. Tetracycline HCl is distinguished for unusual therapeutic activity against both gram-positive and gram-negative organisms, and for the remarkably low incidence of undesirable side effects observed during its use. Nystatin is today's first safe, effective antifungal antibiotic, retarding the manifestation of monilial superinfection frequently the result of therapy with ordinary broad spectrum antibiotics.

SQUIBB QUALITY

—THE PRICELESS INGREDIENT

- ***wide anti-microbial spectrum plus protection against monilial superinfection for safer small animal therapy***

Mysteclin is indicated in the oral treatment of many common infections when caused by tetracycline-susceptible organisms (most gram-positive and gram-negative bacteria, certain large viruses, protozoa, and Rickettsiae), such as:

Abscess	Empyema	Panleukopenia
Actinomycosis	Feline Enteritis	Peritonitis
Bronchitis	Foal Diarrhea	Pharyngitis
Bronchopneumonia	Gangrene	Pig (Baby) Diarrhea
Burns, Infected	Gastroenteritis	Pneumonia
Calf Scours	Infectious Canine Hepatitis	Pyelonephritis
Calf Diphtheria	Lamb Diarrhea	Septic Sore Throat
Canine Distemper (Secondary Infection Of)	Laryngitis	Septicemia
Cellulitis	Leptospirosis	Strangles
Colitis	Meningitis	Surgical Prophylaxis
Cystitis	Metritis	Tonsillitis
Diarrheas, Infectious	Navel Ill	Tracheobronchitis
Dysentery	Necrotic Stomatitis	Urethritis
	Otitis Media	Wounds, Infected

MYSTECLIN offers you several advantages over other commonly prescribed broad spectrum antibiotics:

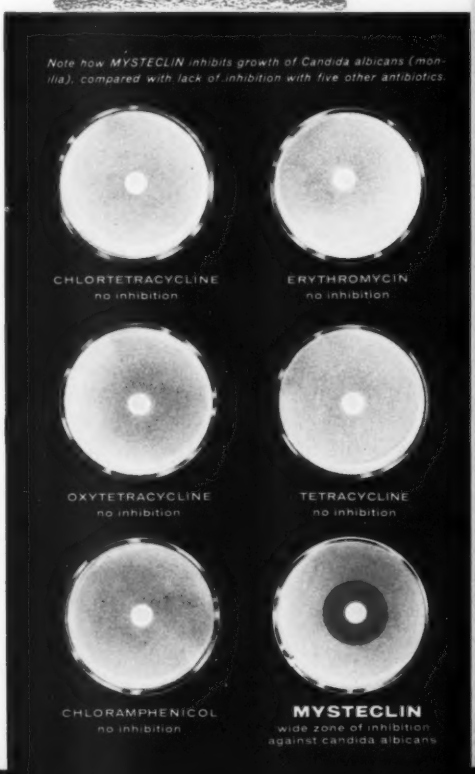
- **retards the danger of monilial overgrowth.**
  Clinical tests with humans indicate that—using Mysteclin—the monilia count in stools decreased in 68% of cases treated. With Tetracycline alone, monilia count increased in 73% of cases treated.*
- **causes fewer gastrointestinal side effects.**
- **produces higher blood levels.**
- **crosses the intact meningeal barrier more readily.**
- **reaches higher levels in the urine.**

*Newcomer, V. D., Wright, E. T., and Sternberg, T. H.: Antibiotics Annual 1954-55, New York, Medical Encyclopedia, Inc., 1955, p. 686.

administration and dosage: **Administration is by the oral route. Dosage (daily, in divided doses):**
Large animals: 5 to 10 mg. per pound.
Small animals: 25 to 50 mg. per pound.

MYSTECLIN is available upon prescription from your pharmacy, through your wholesaler, or from your favorite veterinary supply house. For further information, write: SQUIBB, *Veterinary Products Department*, 745 Fifth Avenue, New York 22, N. Y.

"Mysteclin," "Steclin," and "Mycostatin" are registered Squibb trademarks.



Eleven States Follow Arizona . . .

Before April 25th, eleven states had followed Arizona in providing The New D.V.M. "Silent Partner" Plan for all of the active members of their associations. Thus, a total of 21 states sponsor our "Silent Partner" Plans.

This insurance, offered by Continental Casualty Company, Chicago, Illinois, provides protection against disabilities caused by accidents or sickness. The only exclusions are: war, suicide, pregnancy, military service and flying other than commercial. It provides Loss of Time Indemnity for all active veterinarians, up to age 70, who are state association members, regardless of recorded medical history provided the required percentage of enrollment is reached during the individual state special enrollment period.

This Insurance affords comprehensive coverage. It is free of restrictive riders and eliminative waivers. The insured person, under "Silent Partner" coverage, is provided with monthly indemnity from the first day of total disability due to accident for the duration of such disability—for life.

Total disability due to sickness is covered by indemnities payable from the eighth day at home or the first day in the hospital, whichever occurs first—up to two full years.

Home confinement is not necessary to collect benefits under the D.V.M. "Silent Partner" policy.

All present Policy-owners (Prior to September 1, 1955) requiring additional coverage, may apply for the new nation-wide D.V.M. "Silent Partner" policy. All active members may apply for the LSA (Land-Sea-Air) 4-way special Travel-Accident Policy.

To assist state associations to obtain the required participation for this coverage, Continental Casualty Company is crediting all present "Silent Partner" policy owners to meet participation requirement.

The Company cannot refuse to renew your policy as long as the plan remains in effect until you retire, reach age 70, or cease to be an active member of the Veterinary Medical Profession.

Benefits under the "Silent Partner" Plan are payable regardless of any other insurance, present or future, covering the same loss. Write for descriptive literature on income protection insurance and/or the special LSA Travel Accident Policy.

SILENT PARTNER ASSOCIATES, INC.
Veterinary Department
P. O. Box 824
Evanston, Illinois
AGP 10531-TP 10595

Public Relations Program to Employ Television

A series of television programs on animal disease problems and the values of modern veterinary service is now being furnished to leading TV stations by Associated Veterinary Laboratories.

The series is being issued to the farm editors of 140 leading television stations, coast to coast, according to plans recently announced. The programs, in a combination of words and pictures, take up common animal disease hazards and bring out the importance of veterinary service in coping with these problems. Subjects already scheduled for television treatment include: Swine brucellosis, calf loss prevention, swine erysipelas, hog cholera, pasture season hazards, encephalomyelitis, shipping fever, swine flu, parasites, and ergot poisoning.

Other media used in the public relations program for the profession being underwritten by members of Associated Veterinary Laboratories include newspapers, farm magazines, radio, and motion pictures. Officials of A.V.L. have reported that the organization's film was viewed by a television audience of more than 13,000,000 last year.

▼ ▼ ▼

Eaton Laboratories Establish Veterinary Sales Division

The establishment of a veterinary sales division of Eaton Laboratories is announced by L. Eugene Daily, M.D., vice president of Eaton Laboratories, Division of The Norwich Pharmacal Co., Norwich, N. Y.

The new division has a staff of representatives who will call on veterinarians. It will also handle the distribution and sales of Eaton nitrofuran products through professional veterinary distributors.

The Eaton Veterinary Medical Division has been functioning for several years. Consisting of three graduate veterinarians, headed by Dr. Harold D. B. Roberts, it will continue to conduct clinical studies on those specialties having veterinary applications, which are developed in Eaton's research division.

Austin Laboratories, Ltd., of Guelph, Ontario, will continue to distribute the Eaton veterinary line in Canada.

▼ ▼ ▼

Incidence of both human and swine influenza has been low during the past season.

LaMOTTE
BLOOD UREA OUTFIT

for the determination of the Urea content of the blood.

An indispensable diagnostic aid in the veterinary laboratory, particularly in small animal practice.

Tests are easily and quickly performed, no special training required.

Result is read directly from special Urea Burette. No calculations required. Accurate to 4 mg. Urea per 100 cc. blood. Complete test takes only 15 to 20 minutes.

Tests also available for Sugar in blood and for Calcium/Phosphorus in blood.

Literature will be sent on request.

LaMOTTE
CHEMICAL PRODUCTS COMPANY
Dept. VM Chestertown, Md.

Finest Results

You'll do better with Oster® | *the Veterinarian's Clipper*

Finest results for all professional animal clipping requirements . . . general, plucking length and surgical shaving. You can select the right blade for every operation from a complete range of clipping blades. Detachable cutter head enables you to use all sizes of cutting blades on one clipper.

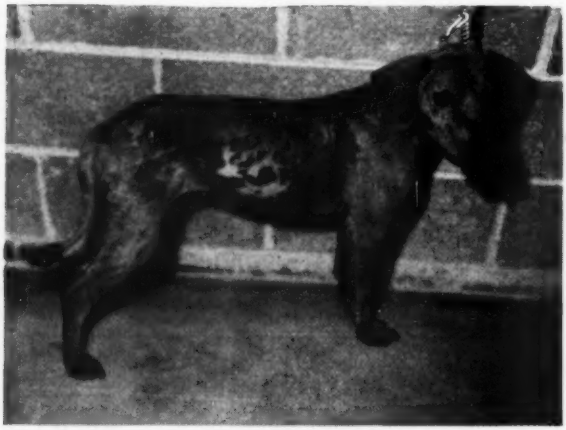
JOHN OSTER MANUFACTURING CO.
Dept. H, 5025 N. Lydell Avenue
Milwaukee 17, Wisconsin, U.S.A.

for 18 months

"...almost every known treatment failed..."

then

DRAMATIC IMPROVEMENT IN JUST 12 DAYS...



BEFORE SELEEN—Hound had suffered from demodectic mange almost from birth. In spite of therapy with almost every type of skin medicament, condition grew steadily worse. Photo taken four days before first SELEEN treatment.

AFTER SELEEN—Marked improvement shows in elimination of mange mites and lesions, clearing of affected areas, regrowth of haircoat. Photo taken 12 days and three SELEEN treatments after first picture.

And *you* can get equally fast control of nonspecific dermatoses and ectoparastic skin conditions in dogs and cats the same way—by treating these pets

WITH

SELEEN®

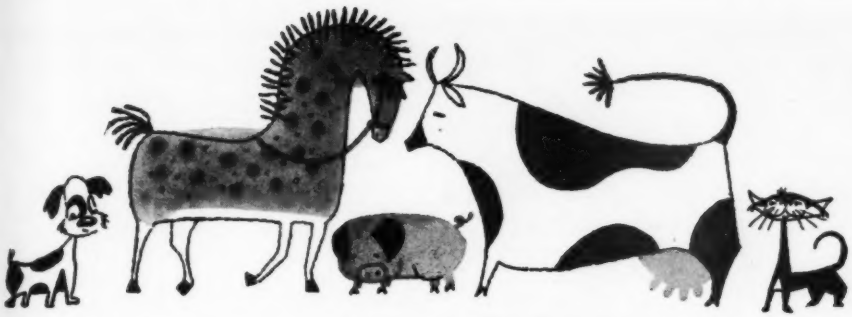
In clinical studies, SELEEN Suspension brought complete control in 87%, definite improvement in another 11%, of all nonspecific dermatoses cases. Moreover, you'll find SELEEN

- *relieves itching and scratching,* usually with the first treatment.
- *cleanses skin and haircoat,* removes tissue debris.
- *kills ectoparasites,* such as fleas, lice, demodex mange mites.
- *improves appearance,* makes coat glossier, healthier looking.

Easy to apply, safe to use, SELEEN takes only 10 or 15 minutes per treatment. Try it. Order from Abbott Laboratories, North Chicago, Illinois; your Abbott salesman, or your distributor.

Abbott

®SELEEN, Selenium Sulfide, Abbott



in any kind of bleeding... "exceptionally effective"[1]

KOAGAMIN® parenteral hemostat

Proved Again by New Reports on 1507 Animals

Use	Number of Animals	Cause of Bleeding	Advantages of KOAGAMIN
to stop bleeding	534 small animals	accident	satisfactory results in 90% of cases[1]
	372 large and small animals	miscellaneous	in many cases bleeding arrested by initial dose[1]
to prevent bleeding	310 dogs	surgery	clearer operative field[1]
	106 dogs and cats	dental extraction	no untoward reactions[1]
	185 aged dogs	surgery	an important drug for routine use in all surgical procedures[2]

1. Rachman, M., and Frucht, T. R.: Vet. Med. *49*:341, 1954.
2. Sternfels, M.: Vet. Med. *50*:82, 1955.

KOAGAMIN, an aqueous solution of oxalic and malonic acids for parenteral use, is supplied in 20-cc. diaphragm-stoppered vials.

Chatham

CHATHAM PHARMACEUTICALS, INC • NEWARK 2, NEW JERSEY

Distributed in Canada by Austin Laboratories, Limited, Guelph, Ontario

Veterinarians Prefer the NEW
Sunbeam
STEWART
CLIPMASTER

NEW
More Powerful Motor . . . 25% greater speed

CLIPS
Dogs, Horses Cows, Mules faster, better

Clip your animals the fast, easy way with the new Sunbeam Stewart electric Clipmaster. Has quiet, powerful, air-cooled, ball-bearing motor inside the cool Easy-Grip handle. Anti-friction tension control assures perfect tension between blades, provides easy adjustment. $42.50 (Colorado and West $42.75).

Grooming Head Fits Your Clipmaster

Special bottom clipping blades for all breeds of dogs. Grooming brush, drill head, sheep shearing attachments, give Clipmaster year 'round use.

Sunbeam CORPORATION
Dept. 98, 5600 W. Roosevelt Road, Chicago 50, Ill.

Laboratory Refresher Training Courses Announced by Communicable Disease Center

The Public Health Service of the Federal Department of Health, Education, and Welfare has shceduled a group of laboratory refresher training courses through the facilities of the Laboratory Branch, Communicable Disease Center, Chamblee, Ga.

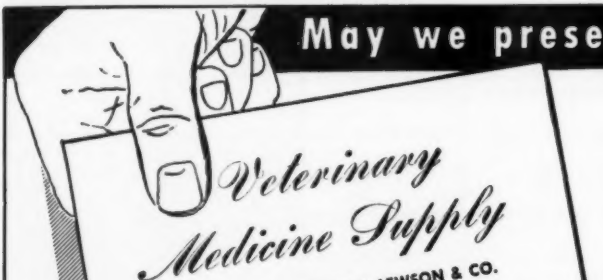
Courses announced in the published schedule are for one to four weeks duration beginning September 10 through March 1957. Subject material includes general bacteriology, parasitology, mycology, and virus disease, technic of laboratory diagnosis of some old and "new" diseases and other subjects of timely interest.

Information and application forms should be requested from the Laboratory Branch, Communicable Disease Center, P. O. Box 185, Chamblee, Ga.

▼ ▼ ▼

Observation that male birds can be raised to broiler weight for approximately 2½c less per pound than pullets has stimulated interest in the use of testosterone and has resulted in extensive investigation of practical use of this and other hormones.

May we present our card?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Medicine Supply
DIVISION OF HERBERT H. LEWSON & CO.
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Manufacturers and distributors of nationally known antibiotics, therapeutics, hormones, biologicals, vitamins, pharmaceuticals, for both large and small animals.

For the veterinarian, our new division provides an expanding new source of proven and thoroughly tested medicinals at favorable prices. The savings inherent in direct handling of your orders by mail are passed on to you. Whatever your needs in bovine, equine, swine, avian, canine or feline practice, we can provide quality therapeutic agents and prompt service to help you perform your professional tasks more effectively and economically.

*Sold only to graduate veterinarians.

*Write for bulk discount prices on your needs to DEPT. PC, 119-05 METROPOLITAN AVENUE, KEW GARDENS 15, N. Y.

Good nutrition shows in a very short time

As a practitioner, you know that when an improperly fed cat is switched to a good diet, the results are quickly apparent in the animal's improved appearance and behavior. Hence there is a great professional satisfaction in recommending a proper diet. Your client does not have to take your advice "on faith," since the results will be quickly *seen*.

That's why you can recommend Puss 'n Boots Cat Food with assurance and confidence. Letters from cat owners, telling us of remarkable improvement in "a few short weeks" of regular Puss 'n Boots feeding, merely confirm the known fact that scientifically formulated nutrition brings rapid results.

Puss 'n Boots provides every nutrient a cat is known to need. The formula includes:

1. **WHOLE FISH,** with nature's balance of life giving nutrients. The fillets are retained for proteins, the liver and glands for vitamins and minerals, the bone structure for calcium and other elements.

2. **SELECTED CEREALS** are added to the finely ground whole fish to provide carbohydrates and roughage—for all-round nutrition.

3. **EXTRA VITAMIN B_1** is added for the benefit of cats requiring B_1 supplementation, and as a "margin of safety" for all cats.

Cat owners can obtain Puss 'n Boots Cat Food, in two handy sizes, at food stores and pet shops everywhere.

PUSS 'n BOOTS is good nutrition

America's largest selling cat food... adds the plus in health, beauty, vigor

Coast Fisheries, Division of The Quaker Oats Company, Chicago 54, Illinois

Ordinary mastitis ointment remains in a blob, restricting the ability of the ingredients to reach the infection.

PROOF

Terramycin* Animal Formula for Mastitis diffuses immediately into the infected quarter

Terramycin Animal Formula for Mastitis reaches the infection quickly with full broad-spectrum action.

These photographs of translucent plastic "quarters" show the exceptionally rapid diffusion of Terramycin Animal Formula for Mastitis contrasted with the restricted spread of ordinary ointments. This is one of the reasons Terramycin Animal Formula for Mastitis is not only *effective*, but is *fast*.

Supplied: Tubes of ½ oz. and 10-dose vials. Each gram contains 30 mg. of calcium dioxytetracycline and 10,000 units of polymyxin B sulfate.

*Brand of oxytetracycline

Department of Veterinary Medicine
PFIZER LABORATORIES
Division, Chas. Pfizer & Co., Inc.
Brooklyn 6, N. Y.

Pfizer

MEETING CALENDAR

American Animal Hospital Association. Annual meeting. Hotel Fontainebleu, Miami Beach, Fla., May 23-26, 1956. W. H. Riser, 5335 Touhy Ave., Skokie, Ill., executive secretary.

Georgia Veterinary Medical Association. Annual meeting. General Oglethorpe Hotel, Savannah, June 10-21, 1956. C. C. Rife, 505 Lindbergh Dr., N. E. Atlanta.

Wyoming Veterinary Medical Association meeting Masonic Hall, Pinedale, June 9-10-11, 1956. J. F. Ryff, P. O. Box 960, Laramie, secretary-treasurer.

California State Veterinary Medical Association. Annual Convention. Hotel Statler, Los Angeles, June 11-13, 1956. Charles S. Travers, 3004 16th Street, San Francisco, executive secretary.

Vermont Veterinary Medical Association. Annual Summer Conference. The Lodge at Smuggler's Notch, Stowe, Vermont, June 21-22, 1956. A. E. Janawicz, Department of Agriculture, Montpelier, secretary.

Michigan State Veterinary Medical Association. Annual meeting. Bancroft Hotel, Saginaw, Mich., June 21-22, 1956. Paul V. Howard, 4011 Hunsberger, N.E., Grand Rapids, secretary.

North Carolina Veterinary Medical Association. Annual meeting, Greensboro, N. C., June 25-27, 1956. C. J. Lange, 3741 Hi-Pt. Rd., Greensboro, secretary-treasurer.

Maritime Veterinary Associations. Joint conference. June 26-28, 1956, Mount Allison University, Sackville, New Brunswick. J. F. Frank, Sackville, secretary joint committee.

Maryland State Veterinary Medical Association. Annual summer meeting. George Washington Hotel, Ocean City, Md., June 28-29, 1956. John D. Gadd, Cockeysville, secretary.

Mississippi State Veterinary Medical Association. Annual meeting. Buena Vista Hotel, Biloxi, Miss., July 15-17, 1956. Harvey F. McCrory, Box 536, State College, Miss., secretary.

Kentucky Veterinary Medical Association. Forty-fifth annual meeting. Seelbach Hotel, Louisville, Kentucky, July 16-17, 1956. Dr. Robert H. Singer, 136 Shawnee Place, Lexington, Ky., secretary.

Iowa State College Annual Conference for Veterinarians. Memorial Union, Iowa State College, Ames, Ia., July 17-18, 1956. Drs. John B. Herrick and D. L. Baker, chairmen.

Virginia Veterinary Medical Association. Semiannual meeting. Natural Bridge Hotel, Natural Bridge, Va., July 17-19, 1956. Wilson B. Bell, 1303 Hillcrest Drive, Blacksburg, secretary.

Alabama Polytechnic Institute Annual Conference for Veterinarians. School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala., July 22-25, 1956. R. S. Sugg, dean.

Pennsylvania State Veterinary Medical Association. Annual meeting. Bedford Springs Hotel, Bedford, Pa., September 12-14, 1956. Raymond C. Snyder, N.W. Corner Walnuts St. and Copley Rd., Upper Darby, Pa., secretary.

Washington State Veterinary Medical Association. Annual meeting. Davenport Hotel, Spokane, Sept. 21-22, 1956. P. J. Pfarr, 6306 N. Wall, St. Spokane, general chairman.

DO YOU HAVE A PROBLEM HERD?

Do some of the animals continue to show symptoms of parasitism in spite of conventional treatment?

It is highly probable we have the answer to your problem. A new anthelmintic for cattle, called Tena-Bov, has recently been developed. It's a wormer that stops death losses and relieves symptoms of parasitism.

Tena-Bov contains purified phenothiazine plus lead arsenate in a special formulation. Reports of research show Tena-Bov to be more effective than other anthelmintic drenches tested . . . often as high as 2½ times more effective.

Many Veterinarians have learned to depend on Tena-Bov for assistance with their parasite problems.

Write for details and prices.

TEXAS PHENOTHIAZINE CO.

P. O. Box 4186 **Fort Worth, Texas**

Oklahoma Conference for Veterinarians. School of Veterinary Medicine, Oklahoma A & M College, Stillwater, September 27-28, 1956. A. L. Malle, Department of Veterinary Pathology, chairman.

Eastern Iowa Veterinary Association. Annual meeting. Hotel Montrose, Cedar Rapids, Ia., October 4-5, 1956. Forrest B. Brutsman, Traer, secretary.

University of Missouri. Thirty-second annual Short Course for graduate veterinarians. Columbia, Mo., Oct. 1-2, 1956. Dr. Cecil Elder, chairman.

South Dakota Veterinary Medical Association. Annual meeting. Hotel Cataract, Sioux Falls, S. Dak., Oct. 4-5, 1956. Dr. J. L. Noordsy, Marion, S. Dak., secretary.

American Veterinary Medical Association. Annual meeting. Municipal Auditorium, San Antonio, Tex., October 15-18, 1956. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago, Ill., executive secretary.

United States Livestock Sanitary Association, 60th annual convention, Hotel Morrison, Chicago, Ill., Nov. 28-30, 1956. Dr. R. A. Hendershott, 33 Oak Lane, Trenton 8, N. J., secretary.

▼ ▼ ▼

Capillary failure under production stresses is the most likely explanation of hemorrhagic disease in broilers.—*J. Russell Couch, Ph.D.*

▼ ▼ ▼

JUNE IS DAIRY MONTH

—DEATHS OF VETERINARIANS—

William Albright, Colfax, Ind., TH '16, Oct. 11, 1955.

J. Leonard Axby, Indianapolis, Ind., CVC '03, April 17, 1956.

Frederic L. Bailey, La Mesa, Calif., COL '50, Jan. 14, 1956.

Ray Merton Batchelder, Holland, Va., OVC '32, Nov. 5, 1955.

Joseph P. M. Bordeau, Ottawa, Ont., MONT '12, Nov. 23, 1955

Lynce C. Bowling, Los Angeles, Calif., ISC '20, Feb. 26, 1956.

Walter L. G. Geick, Fort Branch, Ind., ST JOS '15, Nov. 28, 1955.

Ralph Grahmam, Jefferson City, Mo., ISC '02, Nov. 19, 1955.

Jay W. Harrison, Sandusky, Mich., MCK '14, Feb. 3, 1956.

Orvin T. Hayer, Bloomington, Ill., CVC '15, Dec. 23, 1955.

R. M. Hofferd, Cedar Rapids, Ia., CVC '17, Jan. 28, 1956.

Troy S. Hopkins, Montgomery, Ala., IND '22, Dec.. 5, 1955.

Walter L. Horn, Valders, Wis., CVC '16, Sept. 7, 1955..

John Huebschman, Baltimore, Md., CVC '07, March 12, 1956.

Frank Hurlbut, Yellville, Ark., SF '18, Jan. 28, 1956.

Early E. Joiner, Midland, Texas, TEX '43, Dec. 16, 1955.

James G. Kerr, Beaumont, Texas, UP '08, Jan. 30, 1956.

Herbert H. Kettler, Milford Center, Ohio, OSU '16, Dec. 10, 1955.

George J. Kiger, Alta Vista, Nebr., KCVC '14, March 26, 1956.

Frank E. Kling, Oakland, Calif., IND '11, Jan. 23, 1956.

Otto L. Kranz, Indianapolis, Inc., IND '20, Dec. 11, 1955.

Samuel H. Laws, Kansas City, Mo., KCV '05, April 1, 1956.

Clifford L. Lehman, Flanagan, Ill., CVC '17, Jan. 8, 1956.

Charles E. Massinger, Phoenixville, Pa., UP '27, died recently.

Elmer E. McDaniel, Port Clinton, Ohio, MCK '06, Dec. 15, 1955.

Charles A. Mohr, Tulsa, Okla., KCV '11, Feb. 11, 1956.

Aylmer R. Monroe, Calgary, Alta., ONT '10, Sept. 18, 1955.

Harry B. Morris, Keota, Ia., MCK '13, Jan. 29, 1956.

Archie L. O'Banion, Santa Barbara, Calif., ISC '07, Feb. 18, 1956.

C. B. Orvis, Milton, Calif., CHI '86, Dec., 1955.

William F. Osborn, Corvallis, Ore., DCV '08, died in 1955.

W. L. Parrish, Clanton, Ala., API '17, Jan. 31, 1956.

Benjamin A. Pomeroy, St. Paul, Minn., MON '83, Jan. 12, 1956.

Edgar W. Powell, Newton Square, Pa., UP '00, Jan. 24, 1956.

Benjamin H. Priest, Bakersfield, Calif., CVC '07, May 17, 1955.

Lt. Col. Philip H. Riedel, San Antonio, Texas, IND '11, Jan. 28, 1956.

Nelson A. Runquist, Annadale, Minn., CVC '19, Feb. 15, 1956.

Thomas H. Ruth, Jackson, Minn., CVC '06, Dec. 16, 1955.

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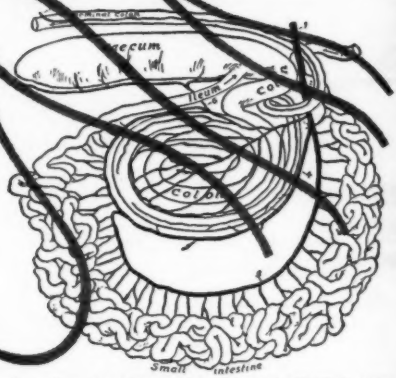

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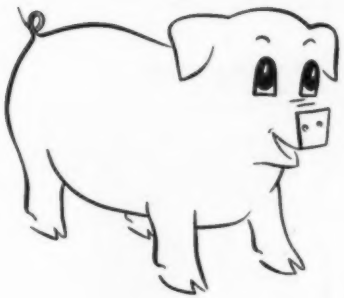

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